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VOLUME XX NUMBER 4

DISEASES

of the

CHEST

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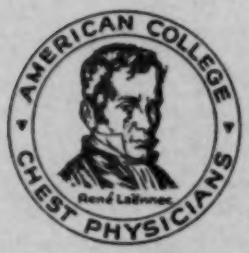

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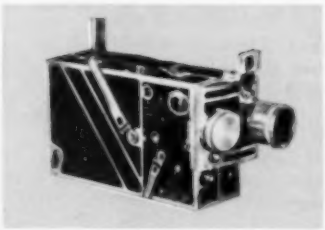

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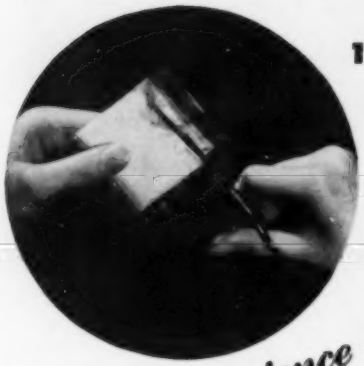

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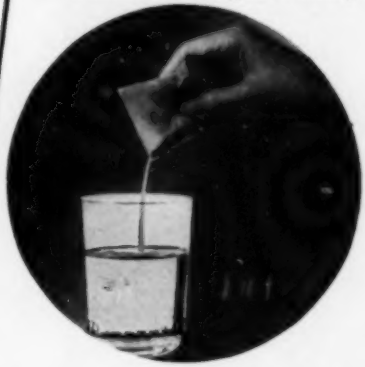

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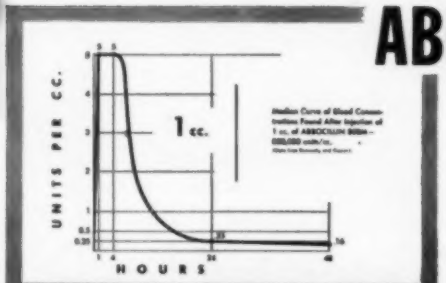

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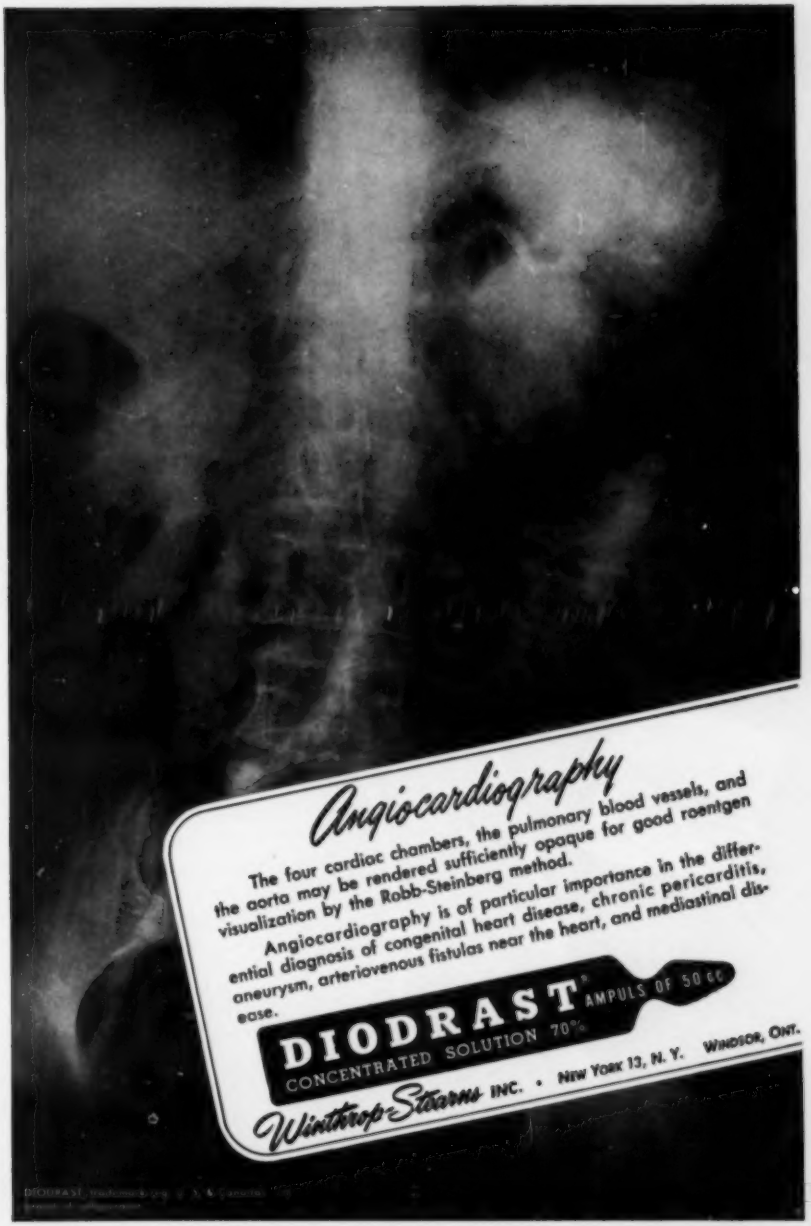
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DISEASES *of the* CHEST

VOLUME XX OCTOBER 1951 NUMBER 4

Bronchial Adenoma
Follow-Up Report After 35 Years

CHEVALIER JACKSON, M.D., F.C.C.P.
Philadelphia, Pennsylvania

The problems of classification of bronchial adenoma call for reports of clinical facts; and, because of the extremely sluggish growth of these tumors, follow-up reports after many postoperative years seem especially desirable. The following case report seems so unusually well documented as to be particularly interesting.

In 1917 I reported a case of bronchial tumor[1] of which the following is an abstract.

An intelligent man aged 35, gave a history of five years of abnormal subjective sensations in the chest, described by the patient as "wheezing; bronchial secretions; flapping at times, as of a ball-valve suddenly shutting off sometimes inspiration, and other times expiration." All these symptoms were intensified by "winter colds, starting in the head." Blood had been noted in the sputum by the patient at various times in form of blood, blood clots and blood streaks. Two years in a sanatorium for tuberculosis ended in discharge because all sputum examinations had failed to support the diagnosis. An abstract of the report of roentgen-ray examination by Dr. George C. Johnston and Dr. John W. Boyce follows: "Left lung normal. Right upper lobe normal, but beginning about one inch below bifurcation a trefoil-shaped shadow extending downward was seen. The diaphragm on the right side could not be distinguished. The lower lobe of the lung was replaced by a shadow having exactly the opacity of the liver (Figure 1). It was impossible to state where the liver ended and the lung began. This portion of the lung could not be made to light up by requested deep inspiration or coughing; but at a subsequent fluoroscopy, two days later, it was noted that the shadowed area would light up, indicating admission of air. Fluoroscopic diagnosis was 'atelectasis due to right bronchial obstruction possibly non-opaque foreign body or endobronchial tumor.'" Dr. John W. Boyce on the basis of physical signs and his own fluoroscopic observations of occasional lighting of the atelectatic shadow made a diagnosis of "atelectasis with occasional reversal of valvular action, due to movable

intrabronchial tumor." At bronchoscopy the pedunculated flopping tumor was found occupying a bronchial dilatation it had made for itself. The bronchoscopically removed tumor histologically resembled an endothelioma and was so reported.[1] The patient made a perfect recovery. The atelectasis had completely disappeared from the right lower lobe in a week after removal of the tumor. In the 1917 report of the case it was stated that one and one half years later the patient was "in perfect health without expectoration or other symptom." A process reproduction of an oil-color drawing of the bronchoscopic appearances of the tumor was published as a color plate with the report. The illustration herewith is reproduced from the original plates (Figure 3). A roentgenogram (Figure 2) made immediately after bronchoscopic removal of the tumor showed beginning clearing of the atelectasis. Pathologists of large experience Ernest Willetts and James Ewing, on examination of the whole growth had difficulty in making a histologic diagnosis, as no tumor of the same histologic structure had been recorded. The mass had some of the cellular characteristics of endothelioma and was so designated.

The bronchoscopic removal under local anesthesia was done in the Chevalier Jackson bronchoscopic Clinic of the Presbyterian Hospital, Pittsburgh, on July 10, 1915. Patient was discharged on July 13, 1915.

In 1941, on reviewing the case in the light of histologic and bronchologic studies in 20 subsequent cases of bronchial adenoma at the bronchoscopic clinic, the conclusion finally reached was that the tumor was a bronchial adenoma.[2,3] This revised diagnosis is amply confirmed by every clinical feature of the case including

FIGURE 1: Roentgenogram (from back) of a man aged 35 years showing atelectasis (alternating type) of the right lower lobe due to valvular bronchial obstruction by a tumor. Reproduced from illustration in American Journal of Medical Sciences, March, 1917.[1]

the painting of the bronchoscopic appearances of the tumor *in situ* (Figure 3) and the subsequent history.

On February 12, 1949, Dr. J. P. Harley in reply to a request for a follow-up report stated, "I am pleased to report that Mr.— is quite well and active in his business and there has been no evidence of recurrence of his tumor which you removed many years ago from the right bronchus by bronchoscopy, when it looked very discouraging to him."

February 19, 1949, radiologist L. E. Wurster reported finding nothing of pathologic significance (Figure 4).

Comment: The points of especial interest presented by the foregoing record of clinical facts seem to me to be as follows:

1) Characteristic features of tumoral bronchial obstruction, namely (a) simulation of the clinical picture of pulmonary tuberculosis by an obstructive bronchial tumor, resulting in two years institutional sojourn; (b) wheezing heard at the open mouth; (c) hemoptysis; (d) coincidence of an attack of acute infection of the respiratory tract with the onset of tumoral symptoms, misleading the patient to give the history that his illness began suddenly with a "heavy cold"; (e) exacerbation of tumoral symptoms after each of the acute infective attacks; (f) relative rarity and mildness of acute attacks after removal of tumoral obstruc-

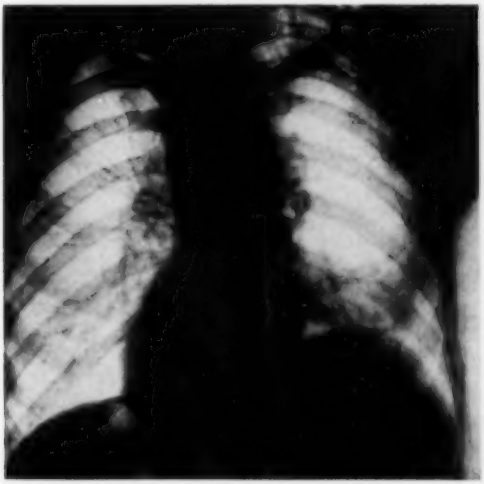

FIGURE 2: Roentgenogram taken immediately after bronchoscopic removal of the tumor in the patient referred to in Figures 1 and 3. The atelectatic shadows are beginning to disappear. (Illustration reproduced from American Journal of Medical Sciences, March, 1917).

tion; (g) slow growth of the tumor as indicated by the history of five years of ill health and the bronchoscopic discovery of a bronchial dilatation the tumor had made for itself; (h) the painting made at the time agrees in every detail with the description of the characteristic bronchoscopic appearances of bronchial adenoma as given in the light of subsequent experience.[5]

2) Diagnosis of a benign tumor in 1915 by cytologic examination of sputum (by Dr. Ernest W. Willetts); a method now recognized as useful clinically, though not conclusive negatively.

3) The first reported instance of alternating atelectasis and emphysema due to tumor and evidenced by (a) subjective sensations of the patient; (b) physical signs; (c) fluoroscopic examination; (d) roentgenograms. (The subjective sensation described by the patient was a "flapping" and also as "of a ball valve shutting off his breath, at times when breathing in, at other times when breathing out." The tumor was of the flapper-valve type of mechanism, not a ball-valve type, but the description coincided perfectly with the phenomenon of alternating atelectasis and

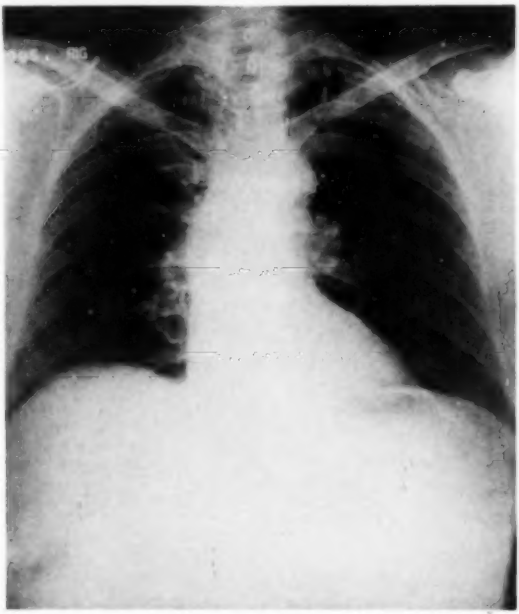

FIGURE 4: Roentgenogram of the same patient as in Figures 1 and 2, made 34 years later and interpreted by radiologist, L. C. Wurster, as showing nothing of pathologic significance. (Patient 70 years old).

emphysema and also with the bronchoscopically observed flapping of the tumor).

4) A histologically malignant obstructive bronchial tumor shown to be clinically benign by the freedom from recurrence for 35 years after bronchoscopic removal of the tumor. The patient is in good health at 70 years of age.

5) Every clinical feature of this case as recorded in text and painting at the time and as evidenced by the present follow-up report and by the histologic problem involved, justify the conclusion that this case was one of bronchial adenoma. As such, it should not be taken as an implication that all bronchial adenomas are to be regarded as benign. It does, however, imply that some of them are, and this constitutes a challenge to scientific medicine to develop means of differential diagnosis between the two classes of case. Histologic classifications are, of course, of fundamental and utmost importance. Clinically, however, it is fundamentally and often vitally important also to know the behavior of a tumor, (a) if untreated and (b) under various forms of treatment. Particularly the physician, surgeon and bronchoesophagologist want to know if a tumor behavior is malignant or benign. These two classes are fundamental, but unfortunately for simplicity of classification all bronchopulmonary tumors cannot be acceptably and definitely placed in either class. For clinical purposes, invloving vital decisions as to diagnosis and treatment, a third class is required in which to place the tumors that are: (a) in some cases malignant, in other cases benign, both histologically and clinically; (b) histologically malignant yet prove to be clinically benign; (c) histologically benign yet clinically prove to be malignant; (d) growths that as a group show a tendency to become the site of a malignant tumoral process; (e) controversial as to whether malignant or benign. All of these groups form a borderline class.

SUMMARY

For clinical purposes, therefore, it seems best to have three classes of bronchopulmonary tumors: (1) benign, (2) malignant and (3) borderline class.

In my opinion it would be best to place bronchial adenoma in the borderline class. This would leave the physicians and surgeons in charge of the particular patient to advise and to do what they deem best for him.

RESUMEN

Para usos clínicos es lo mejor considerar tres clases de tumores broncopulmonares: (1) benignos, (2) malignos, (3) clase intermedia.

Es mi opinión que lo más conveniente es colocar los adenomas bronquiales en la clase intermedia. Esto dejará al médico y al cirujano a cargo del caso, la posibilidad de actuar del modo que más convenga al enfermo.

RESUME

Du point dé vue clinique, il semble judicieux de classer en treis catégories les tumeurs pulmonaires: (1) les tumeurs bénignes, (2) les tumeurs malignes, (3) les tumeurs "à la limite de la malignité."

L'auteur pense qu'il serait opportun de situer l'adénome bronchique dans les tumeurs à la limite de la malignité. Ceci permettrait aux médecins et aux chirurgiens d'agir au mieux de l'intérêt du malade.

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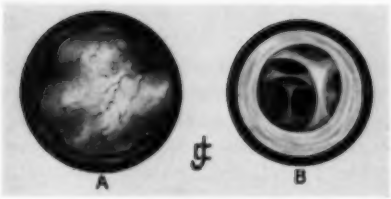

Figure 3. Bronchoscopic appearances of the endobronchial tumor that produced the atelectasis shown in Figure 1. At *B* is shown the bronchoscopic appearances down a normal main bronchus at the level of the view *A*. The large diameter at *A* shows the bronchial dilatation made by the tumor for itself during its slow growth. Tumor removed through the bronchoscope with forceps piecemeal, July 10, 1915. This illustration is printed from the original photoprocess plates made from an oil painting at the time by the Author and published with the case report in the American Journal of Medical Sciences, March 12, 1917.

The Role of Bronchoscopy in the Diagnosis and Treatment of Bronchial Adenoma*

CHEVALIER L. JACKSON, M.D., F.C.C.P. and
CHARLES M. NORRIS, M.D., F.C.C.P.
Philadelphia, Pennsylvania

The role of bronchoscopy is especially important in bronchial adenoma because these tumors almost always arise in the larger bronchi and can be seen and biopsied by bronchoscopy, regardless of the efficacy of bronchoscopic measures in treatment. Even Evarts Graham admits that their recognition dates from the development of bronchoscopy. Time does not permit a review of the literature, but mention must be made of the important early contribution of David Reisner[1] on Intrabronchial Polypoid Adenoma, and of the excellent paper of Kramer[2] on Adenoma of the Bronchus, as well as the masterful contribution of Wessler and Rabin[3] on Benign Tumors of the Bronchus, which appeared in 1932. An excellent review of the literature was published by Patterson[4] shortly before (1930).

The previous contributions to the literature of this subject from the Temple University Clinic will be briefly summarized before presenting a tabulation of our complete series of cases of bronchial adenoma. In the first paper, by Jackson and Konzelmann,[6] published in the Journal of Thoracic Surgery in 1938, after discussing bronchoscopic appearances, which were illustrated in a color plate, the pathology was described by Konzelmann, and bronchoscopic treatment by forceps, the implantation of radon seeds and the use of surgical diathermy was advocated. Twelve cases were reported, all of which are still considered to be cases of adenoma of the "carcinoid" type, except Cases 7, 9 and 12. Cases 7 and 9 we now consider adenoma of the "cylindroma" type and Case 12 we have definitely classed as carcinoma. The two cases of cylindroma type have since died of asphyxia. The patient with carcinoma died with metastasis to the pleura. One of the patients with the carcinoid type of tumor died postoperatively following lobectomy, though she had been symptomatically well for 10 years. Another of the cases of carcinoid type died of car-

*Department of Largngology and Bronchoesophagology, Temple University Hospital, Philadelphia, Pennsylvania.

Presented at the 16th Annual Meeting of the American College of Chest Physicians, San Francisco, California, June 24, 1950, and also at the First International Congress on Diseases of the Chest, Rome, Italy, September 19, 1950.

cinoma of the breast, after 24 years. Six of the original 12 are still living and well, one having had lobectomy because of persisting extra-bronchial tumor and bronchiectasis.

In a second paper by Jackson and Konzelmann[7] published in the Annals of Otology, Rhinology and Laryngology, December 1941, differential diagnosis and nomenclature were discussed, and the importance of early diagnosis regardless of the benign or malignant character of the lesion was emphasized. Particular attention was given to the difficulties in differentiating adenoma from carcinoma. Bronchoscopic treatment was discussed briefly, with follow-up notes on the previously reported cases. The two cases we now regard as adenoma of the cylindroma type were, at this time, regarded as "low grade carcinoma," and the one case of carcinoma was recognized as such. In this paper, one additional case of adenoma of the carcinoid type was reported, in which pneumonectomy was done after bronchoscopic treatment had been found inadequate because of the sessile attachment of the tumor and cavitation in the distal portion of the lung. In the third paper, by Jackson, Konzelmann and Norris[8] published in the Journal of Thoracic Surgery, April 1945, 20 cases were tabulated, 16 of them (80 per cent) occurring in women, and the age ranging from 13 to 44, with the majority occurring in the second and third decades. Seven previously reported cases were included and 13 new ones were added. Of the entire 20 cases, one had been treated by lobectomy, two by pneumonectomy and 10 by bronchoscopic measures alone. All these patients were living and well at

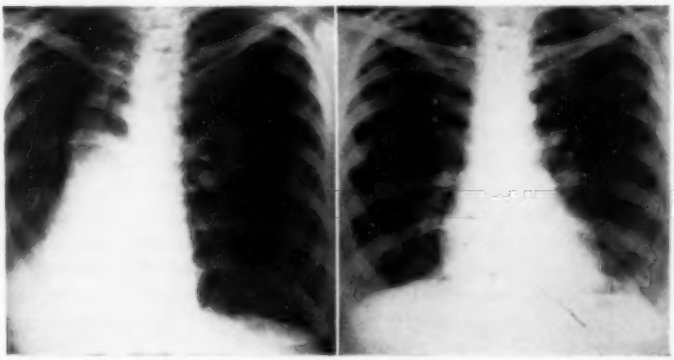

FIGURE 1: To left, roentgenogram showing atelectasis of right middle and lower lobes, with displacement of heart to the right, due to obstruction by bronchial adenoma in a young woman (V. A., 39 years old, Case 2). To the right, roentgenogram taken after endoscopic removal of the tumor, showing normal reaeration.

the time of the report, except one who had died postoperatively, following pneumonectomy.

The indications for lung resection were summarized in this paper, the chief ones being sessile attachment of the tumor and irreversible disease in the distal part of the lung. The importance of differentiating these tumors from carcinoma was emphasized, and the fact that they are considered to have no inherent tendency to become malignant, though they may occasionally do so.

Most of those who have written on the subject of bronchial adenoma are agreed that further study of clinical material, with late follow-up, is necessary before the subject can be really clarified. We are going to present in this paper a report of 40 cases, 36 of them in the so-called "carcinoid" class, and four in the "cylindroma" class. Among the first to suggest this differentiation was Hamperl,[9] and subsequently Moersch and McDonald,[10] and van Hazel, Holinger and Jensik[11] found division into these two groups useful. However, many authorities, such as Rabin, are inclined to separate the "cylindromas" entirely from the adenoma group. Konzelmann in his Chairman's address given at the Section on Pathology and Physiology of the American Medical Association states, however, "these qualifying words ("carcinoid" and "cylindroma") are as meaningless as the term benign adenoma itself, but not wishing to further add to the confusion, I employ them, with apology to the pure of heart."

We are prepared to give the late follow-up on 23 cases previously reported (20 tabulated "carcinoid" cases above mentioned

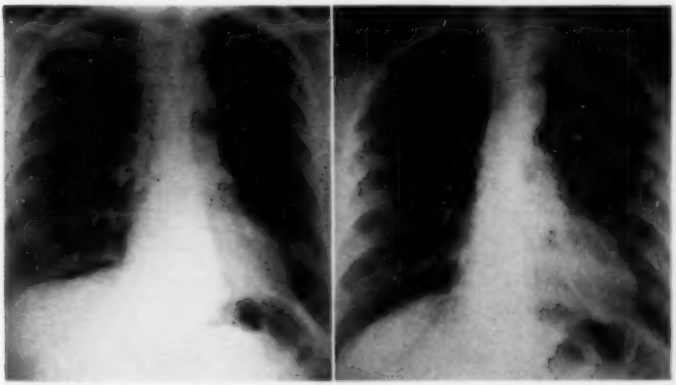

FIGURE 2: To left, roentgenogram showing atelectasis of the left lower lobe in a woman 34 years of age; note triangular shadow with superimposed heart shadow. To right, roentgenogram showing reaeration of lower lobe after endoscopic treatment of tumor (B. A., Case 3).

and one included in our first series of 12 but subsequently discarded, and two "cylindromas" previously reported) with the addition of 17 new cases never reported anywhere, 15 of them of the carcinoid type and two of the cylindroma type. We have

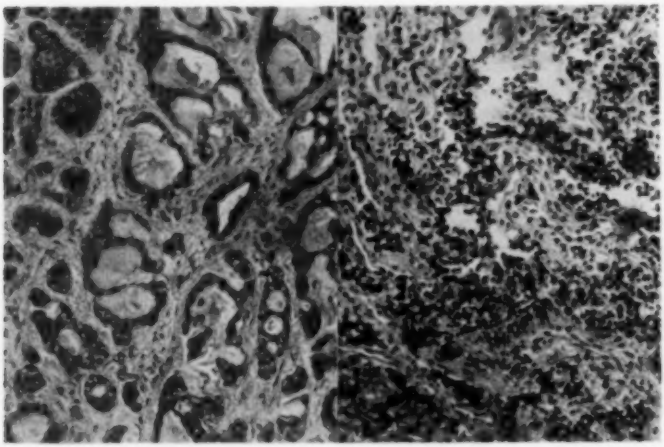

FIGURE 3: Photomicrograph showing the typical low power appearance of "carcinoid" (at left) and "cylindroma" (at right) types of adenoma. At the present time most writers on the subject of adenoma are recognizing these two types of tumors as both belonging to the adenoma group but showing quite different clinical and pathologic behavior. Some authorities would prefer to consider only the carcinoid type as adenoma and group the cylindroma type as an entirely different entity.

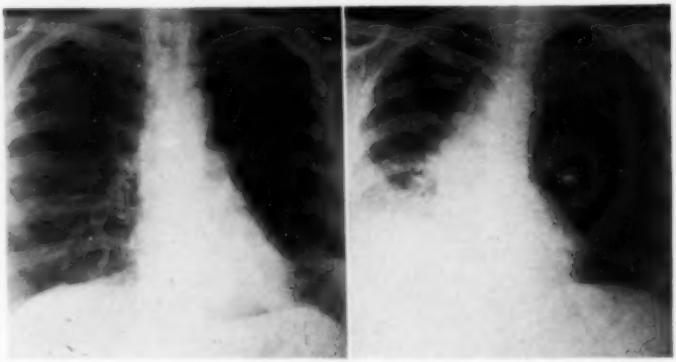

FIGURE 4: Roentgenograms showing obstructive emphysema of left lung, due to adenoma of cylindroma type causing check-valve obstruction of left main bronchus. Film to the left shows inspiration, film to the right, expiration.

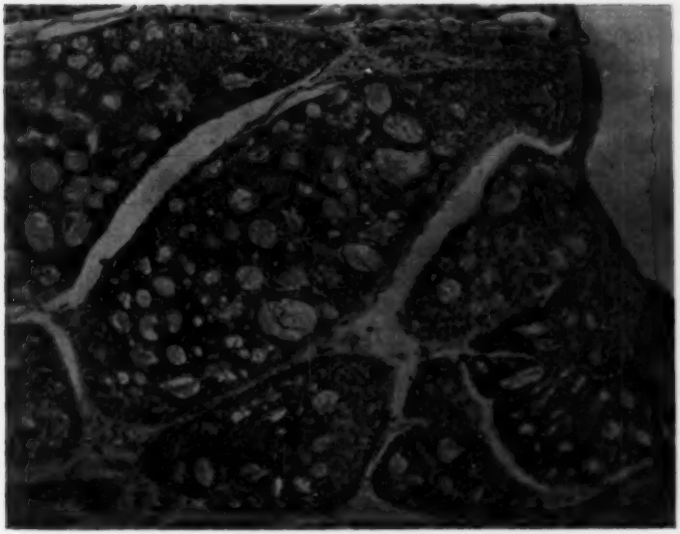

FIGURE 5: Typical histopathologic appearance of adenoma of cylindroma type, sometimes compared to Swiss cheese. This patient died of asphyxia after life had been prolonged for a number of years by palliative endoscopic treatment. Surgical resection of the lung was impossible because the lesion was located at the carina. (A. A., age 38, cylindroma, Case 1).

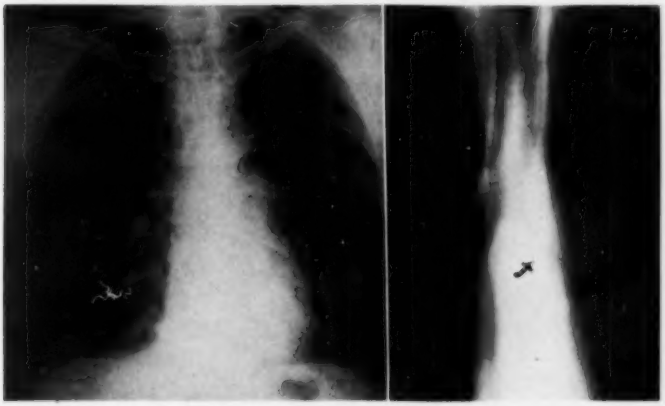

FIGURE 6: To left, roentgenogram appearing essentially normal, in patient with adenoma of cylindroma type located in left main bronchus. At right, planigraphic film showing obstruction of main bronchus produced by tumor. This patient has remained symptomatically well but requires palliative treatment at intervals of several months. Surgical consultant does not advise pneumonectomy, because of the fact that the tumor is located at the carina. (H. S., male, age 45, cylindroma, Case 4).

excluded for the present several doubtful cases which may subsequently be added.

Of these 36 cases of adenoma of the carcinoid type, the average age was a little over 30 and the sex incidence showed marked predominance in women (25 women and 11 men). Twenty-four patients were treated by bronchoscopic measures only, eight were treated by lobectomy (with one postoperative death), and three by pneumonectomy (with one postoperative death); one patient had biopsy only and was lost track of. Only three of the patients in this series of 36 have died, and of these three deaths, two were postoperative. In fairness to our own surgeons, however, it should be added that none of these postoperative deaths occurred among the patients operated upon by them.

The four patients in our series which are considered typical cylindroma cases were all treated bronchoscopically, because in all of them the lesion was too close to the carina to permit the consideration of pneumonectomy. Two of these patients are dead of the disease, but the others are living and symptom free, apparently quite under control by bronchoscopic treatment of long intervals.

Of 35 treated patients only three are known to be dead, two of them postoperative deaths; two have had no recent follow-up (Table I).

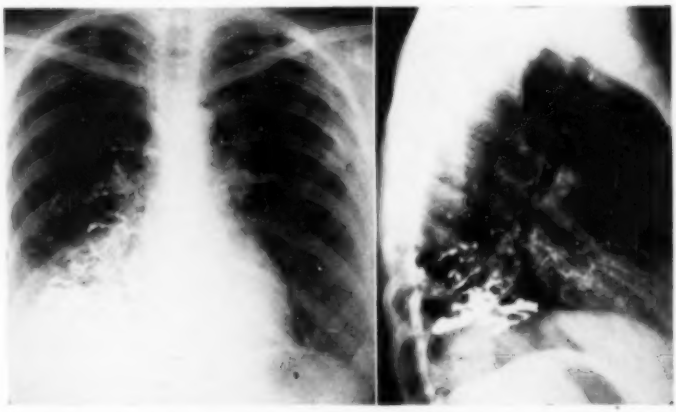

FIGURE 7: Bronchograms showing bronchiectasis of right lower lobe, with normal middle lobe. This patient had an adenoma of the carcinoid type at the orifice of the right lower lobe bronchus. The endoscopic portion of the tumor was removed endoscopically and the patient was fairly well symptomatically for a number of years, but had productive cough at intervals with slight hemoptysis and lobectomy was done by Dr. George P. Rosemond because of the bronchiectasis and persisting extrabronchial portion of the tumor.

TABLE I

ADENOMAS OF "CARCINOID" TYPE

	Case	Sex	Age	Treatment	Result
1	L. A.	F	41	Lobectomy (L U)	Well
2	V. A.	F	39	Bronchoscopic	Well
3	B. A.	F	34	Bronchoscopic	Well
4	E. B.	F	28	Bronchoscopic	Well
5	E. B.	F	28	Bronchoscopic	Well
6	E. B.	M	21	Bronchoscopic	Well
7	M. B.	F	15	Lobectomy (M & R L)	Well
8	E. B.	F	50	Lobectomy (L U)	Well
9	J. B.	M	13	Bronchoscopic	Well
10	J. C.	F	28	Bronchoscopic and Lobectomy	Death (postop.)
11	T. D.	M	42	Bronchoscopic	Well
12	P. D.	M	35	Bronchoscopic	?
13	M. F.	F	44	Bronchoscopic	Well
14	F. F.[12]	M	35	Bronchoscopic	Well
15	J. F.	M	46	Bronchoscopic	?
16	E. G. (H)	F	15	Bronchoscopic	Well
17	B. G.	F	44	Bronchoscopic	Well
18	M. H.	M	15	Bronchoscopic	Well
19	M. H. (C)	F	24	Bronchoscopic	Death
20	A. J.	F	39	Bronchoscopic	Well
21	A. L.	F	33	Bronchoscopic	Well
22	M. L.	F	33	Bronchoscopic	Well
23	L. M.	M	49	Lobectomy (M & R L)	Well
24	N. M.	F	26	Lobectomy (M & L)	Well
25	E. M.	F	45	Bronchoscopic	Well
26	K. N.	F	28	Bronchoscopic	Well
27	A. R.	F	32	Bronchoscopic	Well
28	M. S.	F	37	Pneumonectomy	Death (postop.)
29	B. S.	F	38	Bronchoscopic	Well
30	J. S.	M	31	Bronchoscopic	Well
31	E. T. (K)	F	25	Bronchoscopic and Lobectomy	Well
32	E. T.	F	50	Pneumonectomy	Well
33	G. T.	M	32	Lobectomy (M)	Well
34	L. W.	F	19	Pneumonectomy	Well
35	J. W.	M	37	Bronchoscopic	Well
36	H. W.	F	35	Biopsy only	?

Two of the four patients with adenoma of the cylindroma type are dead of the disease, despite palliative bronchoscopic treatment and two are symptomatically well though they require treatment at intervals (Table II).

As a result of our study of this series of 40 patients, we should like to make a few observations concerning symptomatology and

FIGURE 8: Operative specimen demonstrating clearly the extrabronchial portion of the tumor causing compression. (E. T. Female age 25, Case 31).

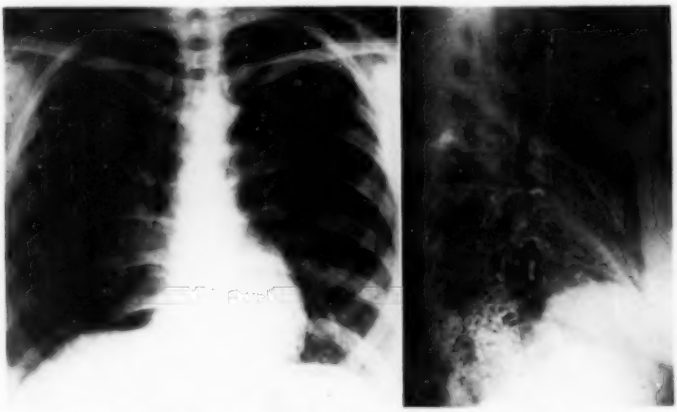

FIGURE 9: Conventional anteroposterior roentgenogram and lateral bronchogram showing a tumor mass, and obstruction of middle and lower lobe bronchi. (Case 24).

diagnosis, pathology and treatment. The symptomatology has already been extensively discussed and it is well known that this type of tumor produces hemoptysis early, is generally accompanied by cough, more often productive than not, and above all by the physical and x-ray signs of bronchial obstruction. Diagnosis is made on the basis of these findings confirmed by the impression given by bronchoscopic appearances, and the opinion of the pathologist based upon study of specimens removed for biopsy. Cytologic studies of secretions have not been so helpful as in carcinoma, but by the nature of the lesion, actual tissue specimens can generally be obtained, because the tumors generally occur in the accessible portions of the bronchial tree.

TABLE II

ADENOMAS OF "CYLINDROMA" TYPE

Case	Sex	Age	Treatment	Result
1 A. A.	F	38	Bronchoscopic	Death
2 F. B.	M	32	Bronchoscopic	Well
3 A. H.	F	56	Bronchoscopic	Death
4 H. S.	M	45	Bronchoscopic	Well

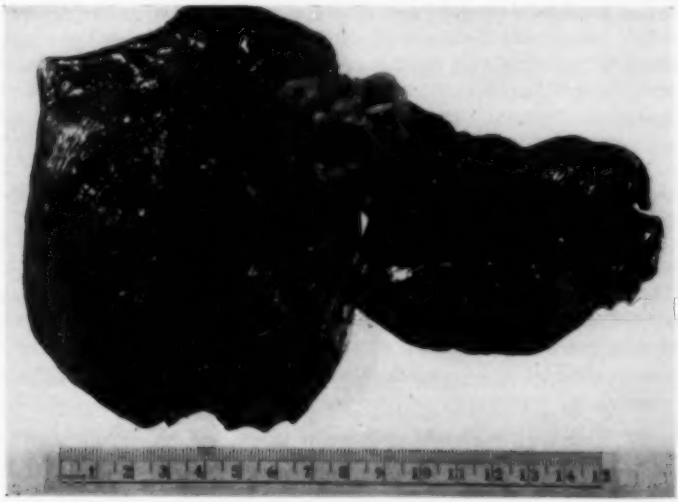

FIGURE 10: Surgical specimen showing tumor mass, with larger portion extrabronchial. Lobectomy by Dr. W. E. Burnett of the middle and lower lobes was done in this case without delay, because it was apparent that endoscopic treatment could not be effective. (N. M., Female, 26 years of age, Case 24).

It has always seemed to us that the crux of the confusion concerning these tumors lay in the histopathology and that the subdivision into different types, as for example "carcinoid" and "cylindroma" types is useful (Figure 3). There has been much discussion as to whether these tumors should be considered benign or malignant, but as Rabin[13] has said, we believe that it is more important to know what they do, than to make a final assertion as to whether they should be considered malignant, or potentially malignant or benign. Chevalier Jackson[14,15] has suggested that they be considered "borderline" tumors and that the question of deciding between benign and malignant be deferred for the present. Of course, malignancy ordinarily depends chiefly on tendency to local invasion and ability to metastasize. Certainly the appearance of local invasion is given by these tumors, as was noted in the first authoritative study of the subject by Wessler and Rabin[3] above referred to. These authors pointed out in 1932 that it was characteristic of bronchial adenoma to extend between the bronchial cartilages and for some of the tumor to be extrabronchial. This cannot in itself be considered a malignant characteristic, because it is probably due simply to the fact that the tumor arises from structures which occur between the cartilages rather than on the mucosal surface. Neither can involvement of contiguous lymph nodes be considered final proof of malignant character. Many of the cases of distant metastasis, as for example to the liver, have been proven to be cases of erroneous diagnosis, but it is probably true that a few of the cases of liver metastasis which have been reported have represented true metastasis of a bronchial adenoma. We admit this, though such metastasis has not been noted in any of our own cases.

SUMMARY

In the light of our experience, we believe that irradiation has been of no proven value; that in many cases bronchoscopic removal is curative, and that in many other cases it constitutes efficacious preoperative or palliative treatment; that bronchotomy as shown by Goldman[16] and others offers a good prospect of cure by a conservative surgical procedure in suitable cases; and that surgical resection by lobectomy or pneumonectomy is definitely indicated in many other cases, because of impossibility of complete local removal compression due to persisting extrabronchial tumor or irreversible changes in the distal portion of the lung. Finally, we definitely believe that in dealing with bronchial adenoma, cases should be *individualized* in selection of treatment method and resection should not be resorted to *automatically* as in carcinoma.

RESUMEN

A la luz de nuestra experiencia, opinamos que la irradiación no ha comprobado su valor; que en muchos casos la extirpación broncoscópica resulta curativa y que en muchos otros casos constituye un tratamiento eficaz preoperatorio o paliativo; que la broncotomía, como lo han demostrado Goldman y otros, ofrece buenas esperanzas de curación mediante un procedimiento quirúrgico conservador en casos apropiados; y que la resección quirúrgica por lobectomía o neumonectomía está definitivamente indicada en muchos otros casos, debido a la imposibilidad de extirpación local completa, de compresión debida a tumor extrabronquial pre-existente o a cambios irreversibles en la porción distal del pulmón. Finalmente, opinamos definitivamente que cuando se considera el adenoma bronquial deben *individualizarse* los casos en la selección del tratamiento y que no se debe emplear la resección *automáticamente* como en el carcinoma.

RESUME

A la lumière de leur expérience, les auteurs pensent que la radiothérapie n'a pas démontré son efficacité dans les adénomes bronchiques. Il pense que dans bien des cas, l'extirpation par voie bronchoscopique suffit à guérir l'affection, et que dans beaucoup d'autres cas, elle réalise un traitement pré-opératoire ou palliatif efficace. La bronchotomie, comme l'ont montré Goldman et ses collaborateurs, permet dans certains ces un traitement chirurgical suffisant et conservateur. L'exérèse chirurgicale avec lobectomie ou pneumonectomie est certainement nécessaire dans beaucoup d'autres cas. Ceci tient à l'impossibilité de supprimer complètement la compression due à ce qui persiste de la tumeur extrabronchique, ou à des lésions irréversibles apparues dans la partie distale du poumon. Pour terminer, les auteurs pensent que pour chaque cas d'adénome bronchique convient un traitement particulier et qu'il ne faut pas se laisser automatiquement aller à pratiquer des exérèses comme pour un cancer.

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Discussion

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Dr. Jackson has again added important information to our increasing knowledge of adenomas. It is only by frequent follow-up case reports, especially of those reported 15 to 35 years ago, that we can learn of the ultimate course of these tumors.

We agree with Dr. Jackson that they are distinct clinical entities. Furthermore, we feel that the cylindromas differ sufficiently in their clinical, gross pathologic and histologic characteristics that they should not be placed in the category of adenomas since such classification invariably confuses the issue of the benign or malignant nature of true adenomas.

Goldman's article in the last issue of Diseases of the Chest, just received—an issue devoted to "Tumors of the Chest" under the editorship of Dr. Banyai, illustrates the manner in which we have come to accept this confusion in classification. His assignment is "Benign Tumors of the Lungs," and the entire article except for one paragraph deals with adenoma and cylindroma in which he grades their malignant characteristics, in spite of a recent article of his on "The Malignant Nature of Bronchial Adenomas."

Thus, as Dr. Jackson states, it would appear that confusion exists because teams of clinicians and pathologists in different parts of the country use the same terminology but do not apply the terms to the same variety of the tumor.

We agree fully with Dr. Jackson in the matter of treatment, as outlined in our presentation before this group two years ago and published in "Diseases of the Chest" last August. Cylindromas are malignant and should be treated as such. Locally invasive adenomas, those with excessive bleeding, or those that have caused extensive peripheral bronchopulmonary disease should be treated by appropriate though conservative surgery, be that pneumonectomy, lobectomy or segmental lobectomy—not total pneumonectomy regardless of the location and extent of the lesion as advocated by some. And, finally, just as adenomas can be resected by local excision (bronchotomy), a significant group of cases reported today with 15 to 30 year follow-up indicates that bronchoscopic removal has an important place in the outline of therapy.

Diffuse Interstitial Fibrosis of the Lungs*

(Report of a Case with Unusual Features)

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Hamman and Rich[1] (1944), first described a series of four cases of diffuse interstitial fibrosis of the lungs of unknown etiology. All cases manifested distinctive clinical and pathological features. The lungs showed a widespread connective tissue hyperplasia throughout the interstitial structures. The alveolar walls were greatly thickened, in the early stages there were many fibroblasts which were later replaced by scar tissue. The alveoli contained little or no exudate. These pathologic changes were progressive in character as evidenced by different gradations in the anatomic age of the fibrous tissue in various sections of the lungs. They resulted in an extreme degree of dyspnea and cyanosis, and finally in myocardial insufficiency due to right ventricular hypertrophy and dilatation.

Reports with essentially similar clinical and pathological features have recently been published by Golden and Tullis,[2] Beams and Harmos,[3] Ferrar et al.,[4] and Potter and Gerber.[5] The duration of the disease from the onset of symptoms to death varied from one to six months in Hamman and Rich's patients,[1] from four to nine months in the two cases described by Golden and Tullis,[2] and 15 months in the one described by Beams and Harmos,[3] and eight months in Potter and Gerber's patient.[5]

Our case is unusual in that the duration of life from the onset of symptoms to death was 36 months. In addition, this patient manifested structural osseous changes, muscular atrophies, and contracture deformities of the hands not previously reported in this disease.

Case Report

A 51 year old white male was admitted to Halloran Veterans Administration Hospital on January 14, 1950, with the complaint of extreme shortness of breath and weakness. The onset of these symptoms dated

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from February 1947, when he first noticed exertional dyspnea. Cardiac disease was suspected at that time but all studies including electrocardiographic tracings were normal. The dyspnea and weakness progressively increased in severity, causing marked limitation of his activities. By early Spring of 1949, he became almost completely bed ridden, and oxygen by mask or tent was administered at intervals for the alleviation of dyspnea.

In March 1949, he was hospitalized at another institution for observation and study. During his stay there, the patient had frequent episodes of night sweats and intermittent temperature elevations to 105 degrees F. He was treated with penicillin (200,000 units q.2.h. for one week), and later with streptomycin (one gram daily for one week) without evident effect on the temperature elevation or clinical course of the disease.

In May 1949, he developed sharp pain and swelling in the joints of both hands, left wrist, right elbow, both feet, ankles, and knees. The pain was at first migratory but soon became persistent and dull in nature. In the subsequent months, there was progressive development of flexion deformities of both hands, generalized muscular and subcutaneous atrophy, clubbing of the fingers and toes, and cyanosis of the nail beds and mucous membranes. In July 1949, he developed a cough, at first nonproductive, which later became paroxysmal and productive of a moderate amount of mucoid and tenacious sputum.

Past History consisted of usual childhood diseases including whooping cough and scarlet fever. He had pneumonia at the age of 10 years, and attacks of influenza at 19 and 30 years. He had intermittent asthmatic episodes of moderate severity in childhood, these persisted at irregular and infrequent intervals until the age of 20 years. From 1922 to 1924, he was employed as a sandblaster and factory worker. For a period of about 20 years, he had been essentially asymptomatic and in good health until the onset of the present illness. The family history was non-contributory.

Physical Examination: On admission to this hospital, the patient

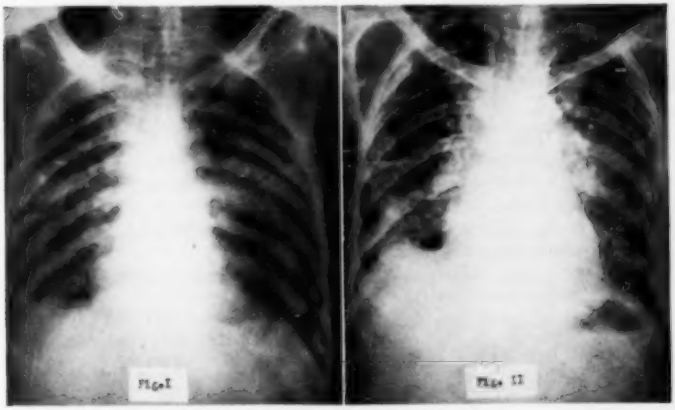


Figure I: Chest roentgenogram, September 13, 1949. There are diffuse mottled and patchy infiltrations, particularly in the lower half of both lung fields. The hilar markings are accentuated. The heart is moderately enlarged.—*Figure II:* Chest roentgenogram, February 4, 1950. Clearer definition of the infiltrations but their extent and nature appear unchanged in both lung fields.

appeared chronically ill, markedly emaciated, dyspneic, and cyanotic. Weight, 103 pounds. Pulse, 130 per minute. Respiration, 40 per minute. Blood pressure, 104/72. There was a marked generalized muscular weakness, subcutaneous as well as muscular atrophy and wasting. The right pupil was smaller than the left and the right lens showed cataract formation. The chest was of emphysematous contour. The diaphragmatic leaves were markedly limited in motion, and the lungs were hyperre-

TABLE I

ESSENTIAL LABORATORY FINDINGS

	1-16-50	1-20-50	2-15-20
R.B.C. (X1000) (cu. mm.)	4,300	4,140	4,100
Hemoglobin (gm.) (per cent)	14.2	13.6	14.6
W.B.C. (cu. mm.)	9,400	8,400	9,300
Neut. (per cent)	88	69	73
Lymph.	8	22	21
Mono.	4	6	4
Eos.		3	2
Hematocrit (per cent)	48	47	
E.S.R. (mm./hr.)	9	14	10
Glucose (mgm. per cent)	95		
Creatinine (mgm. per cent)	1.9		
Protein (grm. per cent)	5.2		
Albumin	3.5		
Globulin	1.7		
CO_2 (Vol. per cent)	73	65	68
Chlorides (m.eq./L)	86	102	94
Potassium (m.eq./L)	4.5		
Sodium (m.eq./L)	146		

Urine—specific gravity, 1.022, few hyaline and granular casts.

Kahn test—negative.

Sputum cultures—pleomorphic diphtheroid bacilli and streptococci, negative for acid fast bacilli.

Spinal fluid—normal dynamics. Culture negative for pyogenic organisms, fungi, and acid fast bacilla.

Gastric contents—negative for acid fast bacilli.

Blood cultures—negative.

Complement fixation test for Q fever and Psittacosis—negative.

Cold agglutinins—negative.

Vital capacity—1,400 cc.—35 per cent.

Arterial O_2 content—13.8 Vol. per cent.

O_2 Saturation—65 per cent.

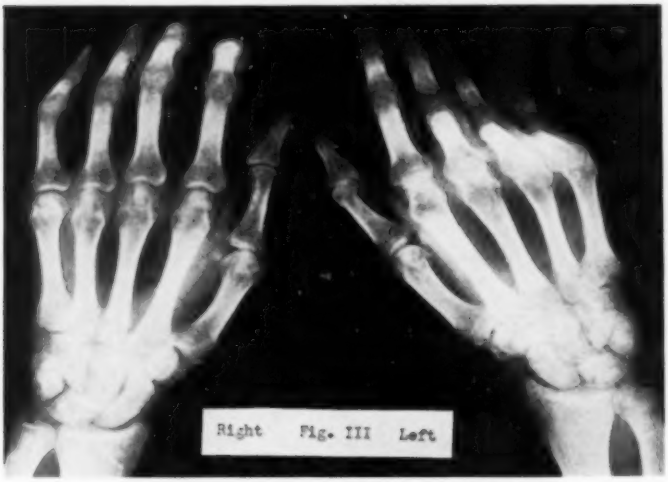
sonant to percussion. Loud rhonchi were audible bilaterally, and crackling rales were present at both bases. The heart was moderately increased in size and showed normal rhythm, but the cardiac sounds were distant, and a soft apical systolic murmur was audible. There was marked clubbing and cyanosis of the fingers and toes, and cyanosis of the mucous membranes. The interosseous muscles of both hands were markedly atrophic. There were flexion deformities, tenderness, and periarticular swelling of the metacarpal phalangeal joints with hyperextension of the interphalangeal joints. All the deep reflexes were hyperactive and equal bilaterally.

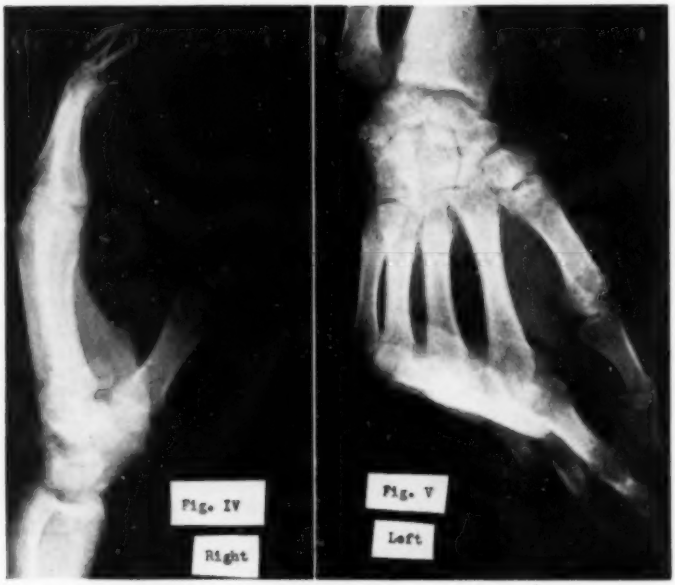
Laboratory Findings: Table I summarizes the essential laboratory findings during the patient's present hospitalization. Sputa cultures were repeatedly negative for tubercle bacilli and pathogenic fungi. The dominant sputa flora consisted of pleomorphic diphtheroid bacilli and beta hemolytic streptococci. The tuberculin test (PPD. .00002 mg.) gave a two plus reaction. The histoplasmin (1 to 1,000) and coccidioidin (1 to 100) skin reactions were negative. Spinal puncture (1/18/50) showed a fluid pressure of 156 mm. of water and essentially normal chemical and cytological findings. Culture of the spinal fluid was negative for tubercle bacilli, fungi, and pyogenic organisms.

A chest roentgenogram at the time of the first hospitalization on September 13, 1949 (Figure I), revealed diffuse, finely mottled and patchy nodular infiltrations throughout both lung fields, particularly in the region of the bases. Roentgenograms of the chest at this hospital on January 15, and on February 4, 1950 (Figure II), showed these infiltrations to be essentially unchanged in extent and distribution. Roentgenogram of the hands on January 18, 1950 (Figures III, IV and V), showed considerable demineralization of the osseous structures, particularly, about the articulations and broadening of the middle and terminal phalanges of the right fifth digit. Deformities of the hands and atrophy of the soft tissue structures were evident.

Serial electrocardiographic tracings showed the following: January 14, 1950: Regular sinus rhythm, S-1 S-2 S-3 pattern; PR interval, 22 seconds; QRS complexes of low voltage (less than 5 mm. in all limb leads). Precordial leads, small R; Large S in V_2, V_4 and V_5. January 22, 1950: Slight increase in voltage of all complexes in limb leads. February 22, 1950: No significant change.

Course in Hospital: Throughout the entire hospital course the patient manifested persistent and severe dyspnea. Oxygen was administered by mask or tent during the major portion of his stay. The administration of a saturated solution of potassium iodide (10 gtts. t.i.d.) for the first two weeks resulted in the expectoration of less viscid sputum. This medication was discontinued because of iodide sensitivity, manifested by lachrymation, fine macular skin eruption, and temperature elevation. Additional therapy consisted of intravenous infusions of aminophyllin in dextrose solution, and intramuscular injections of adrenal cortical extract. These medications were without effect on the patient's general clinical status. Penicillin therapy (300,000 units b.i.d.) and streptomycin (0.5 gram b.i.d.) were administered for two weeks. During this period, his temperature remained at normal levels with only an occasional rise to 102 degrees F. A skin and muscle biopsy was performed on February 2, 1950. Gross and microscopic examination of the tissue revealed it to be normal.





Figures III, IV and V: Roentgenograms of the hands, January 18, 1950. There is demineralization of the osseous structures, particularly about the articulations. The flexion and contracture deformities of the hands as well as the muscular and subcutaneous atrophy are evident.

On February 20, 1950, the patient developed ankle edema, and the liver edge was slightly tender and palpable one finger below the right costal margin. He manifested all signs of congestive heart failure, secondary to cor pulmonale. He was treated with digitalis, mercuhydrin, and a salt free diet without apparent clinical improvement.

On March 1, 1950, after a brief period of restlessness, marked increase in cyanosis and dyspnea, mental clouding and lethargy, he became comatose and expired, on the 45th day of hospitalization and 36 months following the onset of respiratory symptoms.

Necropsy Findings: The necropsy was performed four hours after death. The body was emaciated with a great wasting of muscles of the extremities. There was marked deformity of all the fingers, with hyperextension of the phalanges and flexion of the metacarpal phalangeal joints.

Both pleural spaces contained blood tinged fluid (200 cc. in the left and 500 cc. in the right). Microscopically the pleural surface was thickened by collagen connective tissue and attached to its surface was a large mass of red blood cells, polymorphonuclear leucocytes and fibrin. Many histiocytes and fibroblasts were present at its attachment to the pleura.

The lungs weighed 1800 grams and one section the parenchyma was crepitant and varied in color from grey-black to rust-brown. The tissue was traversed by irregular zones of translucent grey-white connective tissue varying in length from five mm. to two cm. and in thickness from less than one mm. to two mm. The air spaces throughout both lungs were dilated and measured up to three mm. in diameter. The bronchi and bronchioles were irregularly dilated and trabeculated, and the mucous membrane was smooth.

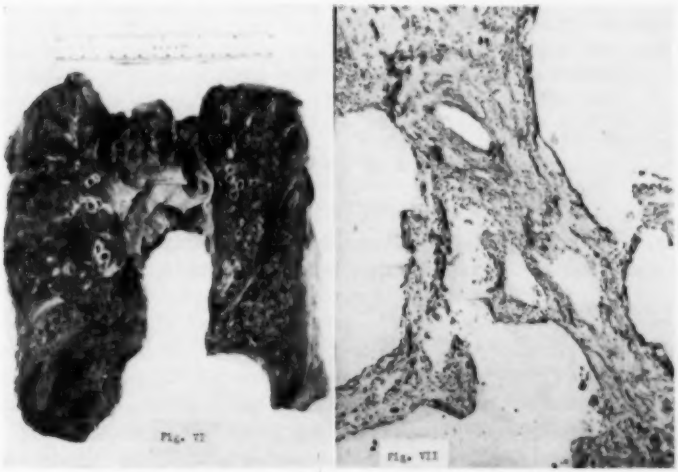


Figure VI: Coronal sections showing a diffuse fibrosis of the lungs more advanced in the lower lobes. The emphysema gives the lung parenchyma a spongy appearance.—*Figure VII:* Photomicrograph of the lung showing great thickening of the interstitial tissue by connective tissue.

Microscopically a diffuse fibrosis was present in all lobes. The alveolar septa were irregularly and extensively thickened by an increase of loose and dense connective tissue. Within these septa were numerous capillaries, fibroblasts, histiocytes, lymphocytes and some plasma cells. In some areas were dense collections of lymphocytes. Some of the alveoli were lined by low cuboidal cells. The connective tissue septa of some of these alveoli had a pink hyaline appearance. Some of the air spaces were partially filled with alveolar phagocytes, red blood cells and occasional polymorphonuclear leucocytes. The alveoli in the intervening portions of the lung parenchyma were irregularly dilated and many of the septa were fragmented. The walls of the arteries and arterioles within the region of connective tissue were extensively thickened by an increase of connective tissue within the intima and adventitia. The lumina of some of the smaller arteries were obliterated by collagenous connective tissue in which were histiocytes and fibroblasts and capillaries.

The pericardial cavity contained 300 cc. of clear yellow fluid. The pericardial surface was smooth and there was a moderate decrease in the amount of subepicardial fat. The heart weighed 350 grams. The endocardial surface was smooth and the valves showed no abnormalities. The wall of the right ventricle measured up to four mm. in thickness, the apex was rounded and the papillary muscles were somewhat flattened. The inflow tract measured seven cm., while the outflow tract measured 10 cm. The wall of the left ventricle measured one cm. in thickness and the apical angle was acute. The inflow and outflow tract each measured seven cm.

The pulmonary artery and all its branches within the lungs showed a moderate loss of elasticity. They contained numerous atheromatous yellow plaques which varied in size from two mm. to one cm. An advanced arteriosclerotic process was also present in the coronary arteries as well as the aorta and its branches.

The liver weighed 1350 grams and the spleen 200 grams. Grossly as well as microscopically these organs showed moderate passive congestion.

The other significant findings in this case included: an encapsulated, calcified focus in a right peribronchial lymph node and one in the spleen (remnants of a primary infection); an atrophy (slight) of the frontal lobe of the brain and dilatation of the lateral ventricles.

Discussion

The features of the cases of diffuse interstitial fibrosis of the lungs which have thus far been reported are as follows:

A) *Clinical:*

1. Advanced and progressive dyspnea as well as cyanosis.

2. Cor pulmonale.

3. Polycythemia, which is not a consistent finding. It was absent in the cases described by Golden and Tullis,[2] and Ferrar et al.[4]

4. The average duration of life from the onset of pulmonary symptoms has been reported as being from four to six months. In some instances the process had been fulminating and lasted only a few weeks.

B) *Anatomic Features:*

1. The pathologic findings characteristic of this process as set forth by Hamman and Rich[1] are: 1) extensive, diffuse and progressive interstitial proliferation of fibrous tissue throughout all lobes of the lungs, associated with focal organization of intra-alveolar hemorrhage, 2) necrosis of alveolar and bronchial epithelium, 3) a hyaline membrane which lines the alveoli, 4) enlargement of the lining alveolar epithelial cells, 5) edema and fibrin deposit in the alveolar walls, 6) eosinophiles in the interstitial tissue may be present, 7) stenosis of small bronchi and bronchioles by mucous plugs and cellular debris or by the interlacing bands of fibrous tissue. The adjacent alveoli show emphysema changes of varying degree.

The gross and microscopic features in our case are those of an interstitial fibrosis of the lungs in which none of the acute changes described by Hamman and Rich[1] are present. Thus we see no edema, fibrin, or eosinophiles in the alveolar walls, nor a hyaline membrane lining the alveoli. These changes were observed in the case of Beams and Harmos[3] where the duration was considered as being 15 months with a latent period of 11 months. The question thus naturally arises as to whether this case is a chronic stage of the process originally described by Hamman and Rich or is an end-stage of some other disease within the lungs.

Differential Diagnosis: Robbins[6] and Mallory[7] in their studies on pulmonary fibrosis and its causes emphasize that the following should be considered as possible causes: tuberculosis, pneumoconiosis, sarcoidosis, chronic pulmonary granulomatosis (beryllium), organized pneumonia (bacterial or viral), fungus disease (aspergillosis), dermatomyositis, scleroderma, periarteritis nodosa, Raynaud's disease, lupus erythematosus, lymphatic spread of carcinomatous metastases, vascular occlusion of idiopathic pulmonary arteriosclerosis, and bronchiolitis obliterans.

Many of the clinical, roentgenographic, and pathologic features in our case described resembled those of scleroderma. The duration of the disease, the osseous changes, the muscular atrophy, and contracture deformities of the hands are more commonly seen in scleroderma than in idiopathic pulmonary fibrosis. The essential differential diagnostic features of the two diseases are summarized in Table II.

The anatomic changes in scleroderma as described by Getzowa,[8] Spain and Thomas,[9] indicate a close similarity to those of idiopathic pulmonary fibrosis. The pulmonary changes in scleroderma consist primarily of cystic changes as well as dense fibrosis in the pulmonary parenchyma. There is an associated diffuse peribron-

chiolar fibrosis, bronchiolectasis, bronchiolar epithelial hyperplasia, obstructive emphysema, as well as atrophy and fibrosis in the musculature of the bronchial tree.

Chronic pulmonary granulomatosis due to beryllium, sarcoidosis, dermatomyositis, and the collagen diseases were considered in this case and were excluded by the clinical manifestations, course of the disease, and necropsy findings. Silicosis was also considered because of the occupational history 20 years previous to the onset of the present illness. However, the long latent period as well as the pathologic findings were not consistent with the diagnosis.

Etiology and Pathogenesis: The etiology of this disease remains obscure. The pulmonary fibrous tissue is non-specific in appearance. The predominance of peribronchial fibrosis is consistent, however, with the end-result of organizing pneumonitis or unresolved primary atypical pneumonia.

Mallory[7] in a review of 6,000 postmortem examinations found that the anatomic diagnosis of pulmonary fibrosis was made in

TABLE II

DIAGNOSTIC FEATURES OF IDIOPATHIC PULMONARY FIBROSIS AND SCLERODERMA

	Idiopathic Pulmonary Fibrosis	*Scleroderma*
Predilection	Respiratory System	Generalized connective tissue disease with predilection for skin, muscles, subcutaneous tissue, and gastrointestinal tract.
Course	Average duration from four to six months	Usually two to three years
Arthritis	Rare	Common
Deformities	Rare	Common
Muscular atrophy	Rare	Common
Skin lesions	Absent	Induration and edema
Subcutaneous nodules	Rare	Common
Heart	Cor pulmonale	Focal or diffuse myocarditis in addition to cor pulmonale
Raynaud's features	Absent	Common
Red blood cell count	Polycythemia	Anemia
Remissions	Rare. Progressive disease	Occasional
Chest roentgenogram	Cystic changes are rare	Common

only 59 instances. In these cases there was a multifocal or generalized involvement of the lungs of sufficient extent to be of clinical significance. In 19 instances the fibrosis was the result of organized pneumonia, and in 10 of these there was an associated history of chronic bronchial asthma.

The past history of an allergic and asthmatic background in our case with superimposed pneumonic and influenzal infections may well have served as the basis for the pulmonary fibrosis. Asthmatic bronchitis delays resolution of a pneumonic process because of a mechanical impediment to drainage of the affected alveoli and bronchioles. Hamman and Rich[1] noted the presence of eosinophilic infiltrations of the interstitial tissue as one of the features of the disease, a finding compatible with an allergic manifestation. Our case did not manifest this finding on histologic study. However, the non-specific diffuse fibrosis undoubtedly represents the end-stage of a previously existing active process of which an allergic reaction may have been a part.

In the cases of primary atypical pneumonia reported by Kneeland and Smetana,[10] Longcope,[11] Saphir,[12] and Golden,[13] the typical anatomic lesion was that of an interstitial pneumonitis in various stages of development. In the early stages the inflammatory process was found chiefly in the interstitial tissues. There was a marked tendency to proliferation of fibroblasts and deposition of collagen fibers in the alveolar walls and peribronchial regions. The appearance and distribution of the lesions as well as the peribronchial predilection of the fibrosis in this case is thus consistent with the end-result of organization of the inflammatory elements in recurrent interstitial pneumonitis.

Extrapulmonary Manifestations: The skeletal, muscular, and trophic disturbances of the hands have not been previously described in cases of idiopathic interstitial pulmonary fibrosis. The question arises as to whether these changes are coincidental findings in this case or whether they occur in this disease when it is of long standing. The changes noted consisted of generalized muscular and subcutaneous tissue atrophy, particularly of the hands, with resulting severe contracture deformity. There was also an osteoperosis of the articular portions of the metacarpal and phalangeal bones and a loss of the regular bone trabeculation. Holt and Hodges[14] list similar skeletal changes in cases with syringomyelia, leprosy, erythromelalgia, Raynaud's disease, acrosclerosis, thromboangitis obliterand, dermatomysitis, and scleroderma.

Cause of Death: Pulmonary or myocardial insufficiency is the usual cause of death in this disease. The diffuse pulmonary fibrosis causes marked loss of pulmonary elasticity and reduction in ventilatory reserve. In addition, the reduction in the functional alve-

olar capillary bed results in interference with the exchange of gases in the alveoli. The compression and reduction in the number of pulmonary capillaries with its subsequent increase in the pulmonary arterial pressure leads to right ventricular dilatation and hypertrophy. This steadily progresses until myocardial insufficiency results. The anoxemia serves as a contributory factor in the genesis of the myocardial insufficiency and heart failure.

SUMMARY

1) A case of idiopathic interstitial pulmonary fibrosis with autopsy findings is presented.

2) This case is unusual in that the duration of the disease from the onset of pulmonary symptoms was 36 months. The greatest duration previously reported was 15 months.

3) There was marked muscular and subcutaneous atrophy and contracture deformities of the hands. This finding has not been previously reported in this disease.

RESUMEN

1) Se presenta un caso de fibrosis pulmonar intersticial idiopática.

2) Este caso es extraordinario porque la duración de él desde la aparición de los primeros síntomas fué de 36 meses. La duración mayor antes referida fué de 15 meses.

3) Había marcada atrofia muscular y subcutánea así como contractura y deformación de las manos. Este hallazgo no se había referido antes en la literatura.

RESUME

1) Les auteurs présentent un cas de fibrose pulmonaire interstitielle idiopathique avec les constatations d'autopsie.

2) Il s'agit d'un cas inhabituel en ce sens que l'affection s'est étendue pendant 36 mois après l'apparition du premier symptome pulmonaire. La plus longue durée qui ait été précédemment rapportée avait été de 15 mois.

3) On constate une atrophie musculaire et sous-cutanée très importante et des contractions déformantes des mains. Ces constatations n'avaient pas été faites antérieurement dans cette affection.

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Cardio-Respiratory Studies in Pre and Post Operative Funnel Chest (Pectus Excavatum)*

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Fourteen years ago an essentially standardized technique for the surgical reconstruction of the thoracic cage in Pectus Excavatum was described by one of us (A. L. B.[1]). We have since followed the primary principles then outlined with minor changes and relative satisfaction. Until recently, many of the indications for operative interference as well as the possible benefits attained thereby have had to be judged empirically. That is, the effect, if any, of operation, was judged primarily by the physician's clinical acumen and the statement of the patient. Neither of these judgments can be statistically accurate. They are obviously subject to bias and misinterpretation. Two years ago we therefore began to study our patients from the cardio-respiratory standpoint both pre- and postoperatively. The tests employed have been mainly some of those suggested by Cournand[2] which appeared applicable to our problem.

The material upon which this report is based consists of 44† personally observed instances of definite funnel chest most of whom were treated surgically. As was to be expected associated congenital anomalies, other than the thoraco-sternal depression, were noted in 14 (31.8 per cent). Twelve of our patients were infants.

Cardio-respiratory studies upon infants were impractical. The "complaints" for which we observed the infants were visible deformity, failure to gain weight, and frequent colds (Table I). Except for two instances of axis deviation in the electrocardiograph no positive findings were observed among those under two years of age. Clinically we have reached the conclusion that the simple operation is completely satisfactory if performed before the sternum becomes fixed in the retracted position, i.e., approximately at a biologic age of 18 to 24 months. Thereafter the adult major type operation must be employed. There is no way of knowing which cases observed in infancy will progress to fully developed

*From the Thoracic Surgery Division, Mt. Zion Hospital, San Francisco. Presented at the Sixteenth Annual Meeting, American College of Chest Physicians, San Francisco, California, June 24, 1950.

†Eleven cases observed in the Department of Thoracic Surgery at the University of California Hospital are included in this group.

pectus excavatum with its accompanying cardio-respiratory disabilities in later life. Therefore, simple operative interference is strongly advised whenever the deep rythmic inspiratory retraction of the distal portion of the sternum and lower anterior thoracic cage persists beyond the 18th month of life.[3]

We consider the deformity of the thoracic cage observed in funnel chest to result from a neuromuscular imbalance whereby the antero-posterior fibers of the diaphragm are overstimulated. Thereby, the chest, and in particular the lower segments of the sternum are retracted on inspiration. The manubrium, xyphoid and contiguous cartilages and ribs become fixed in a retracted position when the phenomenon persists beyond early infancy. In addition, there is an accompanying general decrease in the anterior-posterior diameter of the chest. The heart may remain in its normal mediastinal position or may fortuitously be shifted well into either the right or, as is more frequently the case, into the left hemithorax. Once the pattern of pectus excavatum has become fixed an individually abnormal cardio-respiratory problem should and clinically does result. The extent of the adverse pathologic effect of this unusual physiologic state depends upon the concerted action of the following individually variable factors:

1) Position assumed by the heart.
2) Total decrease in the antero-posterior diameter of the chest.
3) Degree and shape of depression of sternal segments.
4) Age.

TABLE I

"SYMPTOMS IN INFANCY (UP TO 24 MONTHS) — 12 CASES

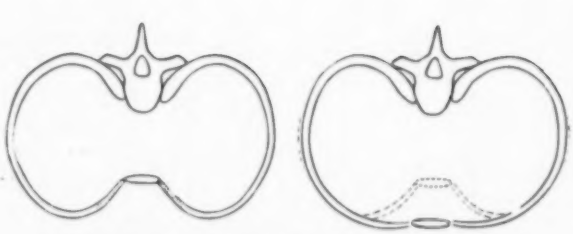
	No. Cases	Per cent
Deformity	12	100
Frequent Respiratory Infections	9	75
Failure to Gain Weight	7	59

"Complaints" for which infants were referred to thoracic Surgeon.

TABLE II

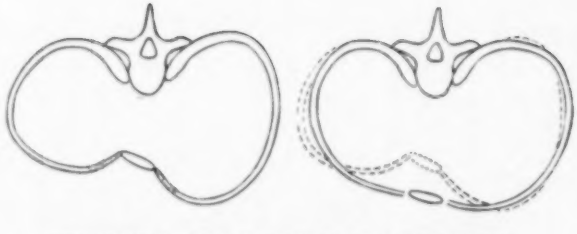
POSITION ASSUMED BY HEART

	No. Cases	Per cent
Right Hemi-thorax	3	7
Beneath Sternum	17	38
Left Hemi-thorax	24	55



DIAGRAMMATIC REPRESENTATION OF ACTUAL INCREASE IN CAPACITY OF THORACIC CAGE IN SPITE OF ACTUAL DECREASE IN PERIMETER OF CHEST.

DIAGRAM 1



DIAGRAMMATIC REPRESENTATION OF ASYMMETRICAL FUNNEL CHEST WITH TILT OF MANUBRIUM, SHOWING TYPE OF IMPROVEMENT ATTAINABLE.

DIAGRAM 2

Although segments of cartilage and rib are removed, elevation of the anterior ends of the ribs increases the antero-posterior diameter of the chest. Thereby, in spite of a decreased perimeter the capacity of the thoracic cage is actually increased.

Position Assumed by the Heart:

The heart may assume any position in the thoracic cage but is most frequently observed in the left hemithorax (Table II). Obviously displacement of the heart from its normal position may well be accompanied by more or less rotation and this is confirmed by the frequent presence of right axis deviation on the electrocardiograph. In one instance the heart was so displaced that the apex was under the right clavicle. One might assume that patients in whom the heart is fixed under the sternum would present predominately cardiac symptoms. Actually this is the case once such symptoms are noted. Cardiac symptoms did exist in a majority of the adults regardless of the position of the heart. But displacement of the heart laterally decreases the likelihood of severe adverse alteration of cardiac function.

Total Decrease in the Antero-Posterior Diameter of the Chest:

Shortening of the diaphragm in its antero-posterior diameter decreases not only the capacity of the thoracic cage but also greatly impedes or completely obliterates the normal elevation of the ribs on inspiration. Thereby one of the three components of the act of respiration is more or less lost to the patient. He is then unable to efficiently clear the tracheobronchial tree of retained secretions. Hence the greatly increased susceptibility to respiratory infections. Seventy-five per cent (9 cases), of the infants and an identical percentage of the adult series (24 cases), exhibited this symptom. Furthermore, frequency of respiratory infections is usually the first symptom complained of and is the one most often satisfactorily influenced by operative interference. Granted that removal of rib and cartilage segments decreases the perimeter of the thoracic cage, concomitant elevation of the anterior rib ends widens the thorax in its antero-posterior diameter. This, plus elevation of the sternum and lengthening of antero-posterior diameter of the diaphragm results in a positive increase in the capacity of the thorax (Diagram 1). Not infrequently there is marked asymmetry of the two sides of the thorax, one side being relatively well developed and the other depressed. The asymmetry is accompanied by a tilt of the manubrium. Operative repair of the deformity does not give a completely symmetrical result (Diagram 2). The asymmetrical status is probably dependent upon one, rather than both, phrenic nerves being overstimulated.

It is appropriate to state here that we believe "pigeon breast" to be due to comparable neuromuscular abnormality in which the lateral fibers of the diaphragm are overstimulated, thereby, causing a contraction of the thorax in its transverse diameter.

Degree and Shape of Depression of Sternal Segments:

The depression of the sternum commonly starts at the junction of the gladiolus and the manubrium and continues to its greatest depth at a constant slope to the xyphoid. We have observed the separation between the anterior bodies of the vertebrae and the xyphoid to be as little as 2 cm. Occasionally a deep spoon shaped depression of manubrium is seen (Figure 1). As was to be expected, the most severe respiratory and particularly cardiac symptoms were noted in those adults whose heart was fixed near the midline and severely impinged upon by a marked depression of the sternum.

Age:

Our patients varied from nine months to 40 years of age. Each decade presented approximately the same number. The majority of all groups exhibited respiratory symptoms of one kind or another. In this series psychological problems related to the funnel chest deformity became manifest particularly in the second decade of life and were apparent as an associated major complaint occassionally thereafter. Similarly "cardiac" symptoms usually appeared towards the end of the second decade and became more frequent

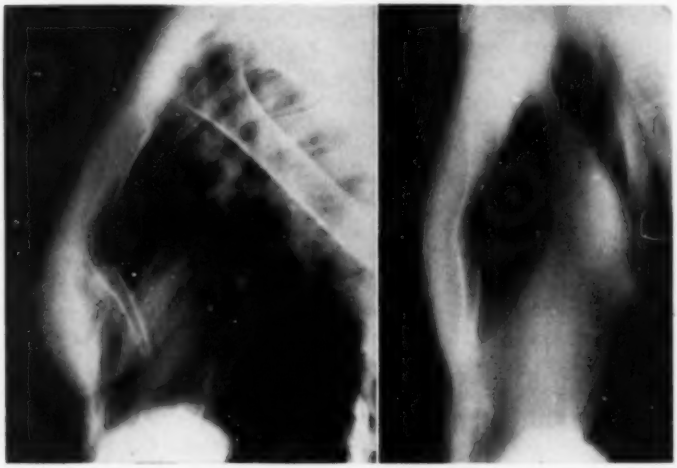


FIGURE 1a FIGURE 1b

Made from x-ray films showing spoon shaped depression impinging directly upon the heart (1a). Tomogram after operative repair showing relief of impingement and absence of angulation of sternal segments. No post operative fixation of any kind was employed in this instance to maintain the correction (1b).

and pronounced as the patient's age increased. Cardiac disease, other than that which could be solely attributed to the thoracic cage deformity, was frequently observed. Suffice it to say that respiratory symptoms and psychological complaints are usually benefited by operative interference. The same can not be said for "cardiac" symptoms. By the time such symptoms become apparent to the patient the underlying adverse pathology appears to be so well established that it probably is irreversible. Most of the patients are benefited by operation, but this benefit appears to be mainly due to the improvement in the associated respiratory symptoms. Perhaps the advance of the cardiac status is retarded. Further observation is needed to definitely establish this impression.

Cardio-Respiratory Studies:

Over two years ago we began to subject all patients with funnel chest to cardio-respiratory tests. This was originally undertaken to make available a definite basis for determining what benefit, if any, might be expected from operative interference. We knew that good structural results and an improved psychological status usually ensued. We wished further to know what physiological changes were brought about. Tests were made as outlined in the accompanying "Chest Work-Up Sheet." It soon became apparent that, for our purpose at least, many of these tests were of no particular value.

TABLE III

PRESENTING COMPLAINT OF INFANT CASES (0-24 mos.)

Patient	Sex	Age	Complaint
R.P.	M	9 mos.	Respiratory
R.M.	M	14 mos.	Respiratory
J.F.	M	15 mos.	Respiratory and failure to gain weight
H.J.	M	16 mos.	Deformity
M.O'B.	F	18 mos.	Failure to gain weight
P.R.	M	18 mos.	Respiratory
R.R.	M	19 mos.	Respiratory
R.G.	M	21 mos.	Deformity
G.S.	F	21 mos.	Respiratory
J.C.	M	21 mos.	Respiratory
A.R.	M	23 mos.	Respiratory
J.T.	M	23 mos.	Respiratory

TABLE IV

PRESENTING COMPLAINTS IN PERMANENT TYPE OF DEFECT

Patient	Sex	Age	Complaint
W.M.	M	2½ yrs.	Respiratory
S.S.	M	3 yrs.	Respiratory
R.V.	M	5 yrs.	Respiratory
V.L.	F	5 yrs.	Psychological
F.H.	M	5 yrs.	Respiratory
E.J.	M	7 yrs.	Respiratory
O.R.	F	7 yrs.	Respiratory
J.J.	M	7 yrs.	Failure to gain weight
M.M.	M	9 yrs.	Respiratory
J.O'R.	M	10 yrs.	Cardiac
J.W.	M	11 yrs.	Respiratory
D.R.	M	13 yrs.	Respiratory
M.S.	F	15 yrs.	Respiratory and psychological
H.H.	M	16 yrs.	Respiratory
L.F.	F	17 yrs.	Respiratory and psychological
T.J.	F	17 yrs.	Respiratory and psychological
M.DM.	F	18 yrs.	Respiratory and psychological Other congenital defects
W.W.	M	18 yrs.	Respiratory
R.C.	M	19 yrs.	Respiratory and psychological
D.D.	M	20 yrs.	Psychological
H.G.	M	22 yrs.	Respiratory
W.M.	M	22 yrs.	Cardiac
M.H.	F	24 yrs.	Cardiac (congenital) and Respiratory
J.M.	M	24 yrs.	Respiratory and cardiac
M.M.	F	25 yrs.	Respiratory and cardiac
G.C.	F	28 yrs.	Cardiac and psychological
H.C.	F	32 yrs.	Respiratory
L.H.	F	32 yrs.	Respiratory and psychological
L.J.	F	34 yrs.	Respiratory
H.M.	M	35 yrs.	Cardiac cripple and respiratory
H.A.	F	36 yrs.	Respiratory, cardiac and psychological
G.W.	F	40 yrs.	Cardiac and respiratory

THORACIC SURGERY CLINIC — CHEST WORK-UP

Patient Date

Provisional Diagnosis

I. VENTILATORY FUNCTION:

1. Vital Capacity ..... cc.

	Basal	Exercise	After Exercise 1' 2' 3' 4' 5'
2. Max. Breathing Cap. (l/min.)			
3. Ventilation (l/min.)			
4. Breathing Reserve (l/min.)			
5. Ratio: $\frac{BR}{MBC} \times 100$ (in %)			

II. RESPIRATORY FUNCTION:

1. Oxygen Intake,
   (a) in cc./lit. vent.
   (b) in cc./sq.m.B.S.A.
2. Arterial O_2 Saturation,
   (a) O_2 content (Vol.%)
   (b) O_2 capacity (Vol.%) Hgb: gm.
   (c) O_2 saturation (%)

III. CARDIO-PULMONARY FUNCTION:

1. Exam. of heart .....

   E.C.G. .....

2. BP ..... 3. Venous Pressure ..... cm. H_2O

4. Circ. Time (Decholin arm to tongue) appearance ..... sec.

   Disappearance ..... sec. more

5. Response to rapid IV infusion of 1500 cc. of NSS in 30 min.

   Vital Cap. before ..... cc. Vital Cap. after ..... cc.

   Per Cent Reduction ..... %

IV. CONCLUSIONS:

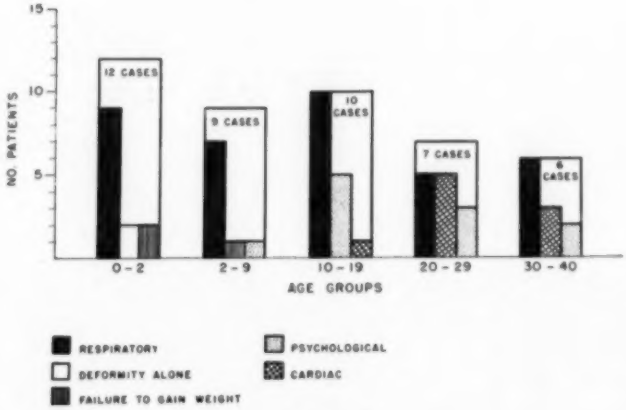


FIGURE 3

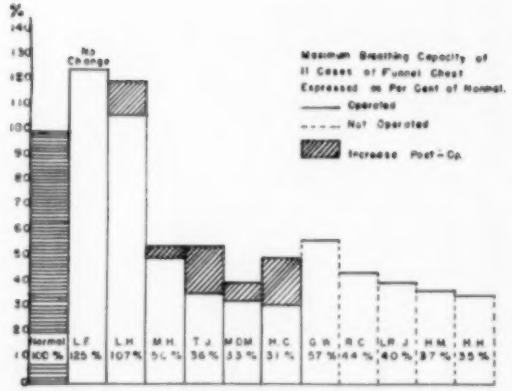


FIGURE 4

Figure 2: Graphic representation of principle complaints by decades. It is clear that respiratory factors predominate at all ages. Psychological problems are prominent from the second decade onward. "Cardiac" symptoms appear late. — *Figure 3: Comparative* and Post Operative Maximum Breathing Capacity.

Specifically we might summarize our experience with each examination as follows:

Vital Capacity: Normal or above unless complicated by other pathology.

Maximum Breathing Capacity: Of value in all cases.

Ventilation: No particular deviation from normal.

Breathing Reserve: This will be reduced at the same time maximum breathing capacity is reduced. Unnecessary additional test.

Oxygen Intake: No remarkable deviation from normal.

Examination of Heart: No specific findings except in presence of independent heart disease. Usually less is evinced than is evidenced by x-ray and electro-cardiograph studies.

Blood Pressure: All within normal limits.

Venous Presure: All within normal limits.

Circulation Time: All within normal limits.

Thus we are left with two tests of value, i.e., maximum breathing capacity and electrocardiograph.

Determination of the maximum breathing capacity in 11 cases preoperatively showed it to be diminished 50 per cent or more in nine instances. It was beneficially increased an average of 31 per cent by operative interference (Figure 4). In two instances where operation was delayed, repeated examinations showed a gradual decrease in the maximum breathing capacity.

Comparison of pre- and postoperative maximum breathing capacity determinations on persons with a fully developed pectus excavatum deformity were informative. They sometimes showed immediate postoperative improvement which was only partially maintained, tending to become somewhat reduced particularly after about three weeks although never to the preoperative level. These results prompted a change in the operative technique[4] and the institution of a regime of breathing exercises and voice training early in the postoperative convalescent period.

Electrocardiographic tracings were often reported as abnormal but there appears to be no type pattern uniformly present or attributable to pectus excavatum. These were reviewed by Dr. A. Gropper, a cardiologist, at the Mt. Zion Hospital. He reported that of 16 cases studied preoperatively nine showed abnormal electrocardiograms, only three of which could not be attributed to other complicating factors. Moreover, comparative pre- and postoperative records in 11 patients showed postoperative changes in only three instances, either immediate or late, which might be considered as demonstrating improvement resulting from operation. These consisted in:

1) Improved A-V conduction.

2) More normal appearance of previously depressed S-T segment and inverted T waves.

3) P wave changes most likely due to rotation.

Lack of demonstrable improvement in the postoperative electrocardiographic tracings does not necessarily mean that benefit to the impaired cardiac status has not been attained.

Lester[4] states he has seen no immediate postoperative change in the electrocardiogram. Dorner[5] et al., report one instance in which the electrocardiogram taken the second postoperative day showed the right heart strain pattern had entirely disappeared and the P waves were normal.

Either a diminished maximum breathing capacity, an abnormal electrocardiogram, or both, may be obtained in a patient who is not yet aware of any cardio-respiratory symptoms.

It therefore appears reasonable to add both maximum breathing capacity determinations and electrocardiographic tracings to the preoperative study of a patient with funnel chest. Abnormal electrocardiographic tracings and lowered maximum breathing capacity determinations are additional indications for operative intervention. This is of particular value in those instances in which cardio-respiratory symptoms have not as yet become manifest. Repeated maximum breathing capacity determinations showing decreasing capacity would lend further weight to the advisability of recommending operation in the patient concerned.

We have considered and plan to do cardiac catheterization studies in selected cases. These should be of more than academic interest in establishing a better knowledge of the underlying disturbed physiology brought about by the pectus excavatum deformity. But it does not appear that they will usually be necessary to establish the advisability of operation in the majority of instances.

SUMMARY

1) Cardio-respiratory studies on infants are impractical.

2) Simple operative interference is advisable before the sternum becomes fixed in the retracted position, approximately at a biological age of 18 to 24 months. Such a procedure has thus far uniformly obviated the occurrence of adverse cardio-respiratory physiology in later years.

3) The extent of abnormal cardio-respiratory physiology in pectus excavatum is dependent upon four factors: (a) position assumed by the heart, (b) total decrease in the A.P. diameter of the chest, (c) degree and shape of depression of the sternal segments, and (d) age.

4) Respiratory symptoms predominate throughout all age groups.

Psychologic complaints are primarily noted in the second decade of life. Cardiac symptoms manifest themselves late in the course of the disease. They are apparently less influenced by surgery than either respiratory or psychologic deviations which are prone to be benefited by operation.

5) Determination of maximum breathing capacity is the best single test of the status of respiratory physiology in funnel chest. Decreased capacity may be noted before the patient himself is symptomatically affected. Repeated determinations may indicate progress of the disease preoperatively and comparative postoperative studies show what operation has accomplished.

6) Electrocardiographic studies are often reported abnormal but no findings peculiar to pectus excavatum are noted. In our series there were three instances entirely attributable to pectus excavatum in which improved postoperative tracings were obtained.

7) Determination of maximum breathing capacity and electrocardiographic tracings are valuable adjuncts in evaluating the status of an individual with pectus excavatum.

8) Cardiac catheterization studies are planned. They should give a better understanding of the disturbed physiology in pectus excavatum.

RESUMEN

1) Los estudios cardiorrespiratorios en los infantes son poco prácticos.

2) Antes de que el esternón se fije en la posición deprimida, o sea aproximadamente a la edad de 18 a 24 meses, es aconsejable la intervención quirúrgica sencilla. Este procedimiento ha evitado constantemente la aparición de trastornos fisiológicos cardiorrespiratorios en los años ulteriores.

3) La extensión de las alteraciones cardiorrespiratorias en el "pectus excavatum" depende de cuatro factores: (a) posición adoptada por el corazón, (b) total decrecimiento en el diámetro A.P. del tórax, (c) grado y forma de la depresión de los segmentos esternales, y (d) la edad.

4) Los síntomas respiratorios predominan a través de todas las edades. Las quejas de orden psicológico aparecen en la segunda década de la vida. Los síntomas cardiacos aparecen más tarde en la vida. Estos son aparentemente menos influenciados por la cirugía que los respiratorios y los psicológicos.

5) La determinación de la capacidad máxima respiratoria constituye el mejor procedimiento aislado para estimar el estado de la fisiología respiratoria en el pecho en embudo. Las pruebas reiteradas pueden indicar la marcha de la enfermedad antes de la opera-

ción y las postoperatorias demostrarán lo que la operación ha logrado.

6) Los estudios electrocardiográficos a menudo son referidos como anormales, pero no se han anotado hallazgos propios del "pectus excavatum." En nuestras series hubo tres casos enteramente atribuibles a pectus excavatum en los que los trazos postoperatorios mostraron mejoría.

7) La determinación de la capacidad máxima respiratoria y el electrocardiograma son adjuntos valiosos para valuar el estado de un individuo con pectus excavatum.

8) Se proyectan estudios del corazón por la cateterización. Ellos harán comprender mejor el trastorno que en pectus excavatum hay sobre la fisiología.

RESUME

1) Les études cardio-respiratoires sont impossibles chez les jeunes enfants.

2) Une opération consistant simplement à déplacer le sternum est possible avant que celui-ci ne soit fixé en position de rétraction, ce qui survient de 18 à 24 mois. Un tel procédé a, d'une façon générale, empêché dans la totalité des cas l'apparition de troubles cardio-respiratoires dans les âges plus avancés.

3) L'apparition de troubles cardio-respiratoires dans les cas de dépressions thoraciques dépend de quatre facteurs: (a) position prise par le coeur, (b) diminution totale du diamètre antéro-postérieur du thorax, (c) importance et forme de la dépression sternale, (d) âge du malade.

4) Les symptômes respiratoires sont prédominants pour toutés les catégories d'âge. Les manifestations psychiques n'apparaissent que dans la seconde décade de la vie. Les signes cardiaques se manifestent tardivement au cours de la maladie. Ils sont apparemment moins influencés par l'opération chirurgicale que les troubles respiratoires ou psychiques.

5) La détermination de la capacité respiratoire maximum est le meilleur test pour juger de l'état respiratoire dans les cas de dépressions thoraciques. Une diminution de la capacité peut être constatée avant que le patient ne ressent lui-même les symptômes. Des mesures répétées permettent de suivre les progrès de ces troubles, et de se rendre compte après l'opération des résultats que celle-ci a pu obtenir.

6) On a souvent rapporté les modifications électrocardiographiques, mais on n'a jamais signalé de constations particulières à cette affection. Dans nos séries, dans trois cas, les troubles étaient complètement attribuables à la dépression thoracique, et les tracés montrèrent des progrès après l'intervention.

7) La détermination de la capacité respiratoire maximum et les tracés électro-cardiographiques sont des auxiliaires utiles pour évaluer le bilan d'un individu atteint de dépression thoracique.

8) L'auteur a l'intention de faire des cathétérismes cardiaques. Ceux-ci donneraient de meilleurs renseignements sur les troubles physiologiques dans les dépressions thoraciques.

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Streptomycin as an Adjunct to the Therapy of Pulmonary Tuberculosis*

A Long Term Study

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During the period since streptomycin was introduced in the treatment of clinical tuberculosis by Hinshaw and Feldman in 1945,[1] it has attained an established place in the management of pulmonary tuberculosis. Experience has indicated that there are limitations to the effectiveness of streptomycin. Moreover, the specific areas in which it is most effective and the best methods of using it have not been sufficiently delineated.

There are some unsettled problems as to the most effective use of streptomycin in various types of pulmonary tuberculosis and in conjunction with collapse therapy. Some questions needing additional exploration are: (a) the timing of the administration of streptomycin in relationship to the initiation of collapse therapy; (b) the expected results from the use of streptomycin in respect to the type and extent of disease with and without collapse therapy; and, (c) the long term results of streptomycin therapy when combined with collapse therapy.

Between November 1946 and June 1948, a group of 46 patients with a generally poor prognosis were treated with streptomycin. These patients were followed until November 1949. The majority of them had a poor immediate prognosis, a poor prognosis for collapse and a poor ultimate prognosis. Thirty of these patients received some form of collapse therapy and have been followed from 18 to 32 months. The analysis of the results obtained some three years after the initiation of the study were of interest in respect to the aforementioned problems.

Method of Use

Originally streptomycin was given in five doses totaling one and one-half to two grams a day. Beginning in December 1947, the dosage was changed to 20 milligrams per kilogram of body weight with a top dosage of one and one-half grams daily. Injections were given three times a day.

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Material

Forty-six Negro patients on the wards of the Tuberculosis Service of Freedmen's Hospital were studied.

Thirty-three were females and 13 males. They ranged in age from 15 to 61 years. The type of therapy given these patients was decided by the regular staff therapy conference. For purposes of analysis the results may be studied in three categories:

Group I: Patients receiving streptomycin and pneumothorax (13).
Group II: Patients receiving streptomycin for whom major chest surgery was planned (17).
Group III: Patients receiving bed rest and streptomycin (16).

Terminology and Classification

In designating the type of disease the quantitative classification of the National Tuberculosis Association was used. For purposes of study, the extent of pulmonary disease is estimated as a percentage of the total frontal area of lung on the posterior-anterior chest film taken at six feet (See Table I).

Principal Disease: This term indicates the involved area of the lung which contained dense pneumonic consolidation or cavity with its immediately surrounding exudative or fibrotic components. In the absence of cavity, diffuse hematogenous infiltrates of exudative or exudative-productive type are arbitrarily considered principal disease.

Spread: Pulmonary infiltration other than cavitary which appears to be the result of bronchogenetic spread.

Pneumonic Consolidation: This indicates principal disease which on x-ray film shows the predominant character of tuberculous pneumonia.

Cavitary Caseo-pneumonic Disease: This is the type of disease which consists of cavity and its immediately subjacent exudate or fibrotic reparative reaction.

Exudative Disease: Infiltration not directly associated with cavity which on x-ray film is predominantly soft with poorly defined blurred margins.

Productive Disease: Infiltration which on x-ray film is composed of sharply defined "spots," strands, or linear densities and which is not part of the reparative fibrosis associated with cavity.

Cavities:

Type 1: Cavities without established wall representing loss of substance by liquefaction and expulsion of caseation from a pneumonic consolidation.

Type 2: Cavities with young fibrous wall. These are round cavities of the "annular shadow" type showing evidence of fibrous organization in their walls.

Type 3: Cavities with old fibrotic wall. These are mostly multilocular structures with dense irregular and distorted surrounding walls, and considerable evidence of reparative fibrosis.

Prognosis: The prognosis of the patient based upon the clinicians' study of all available evidence was rated as poor, fair, good, or excellent (See Tables IV and V). The prognosis is given in three categories:

(a) *Immediate Prognosis:* The estimated prospect of the patient remaining alive for a maximum of three months after the start of therapy.

(b) *Prognosis for Collapse:* The estimated chance of being able to administer pulmonary collapse successfully without endangering

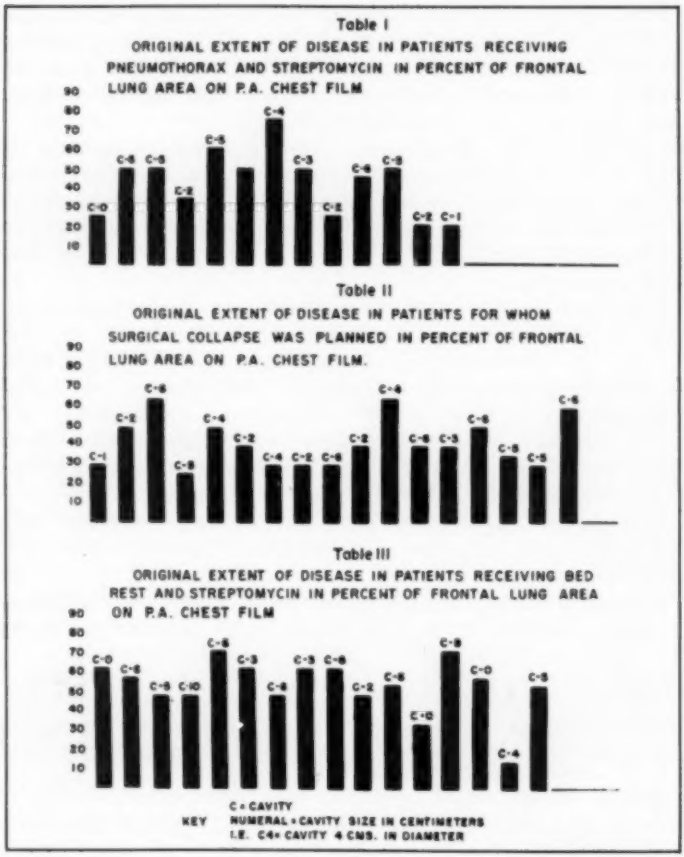
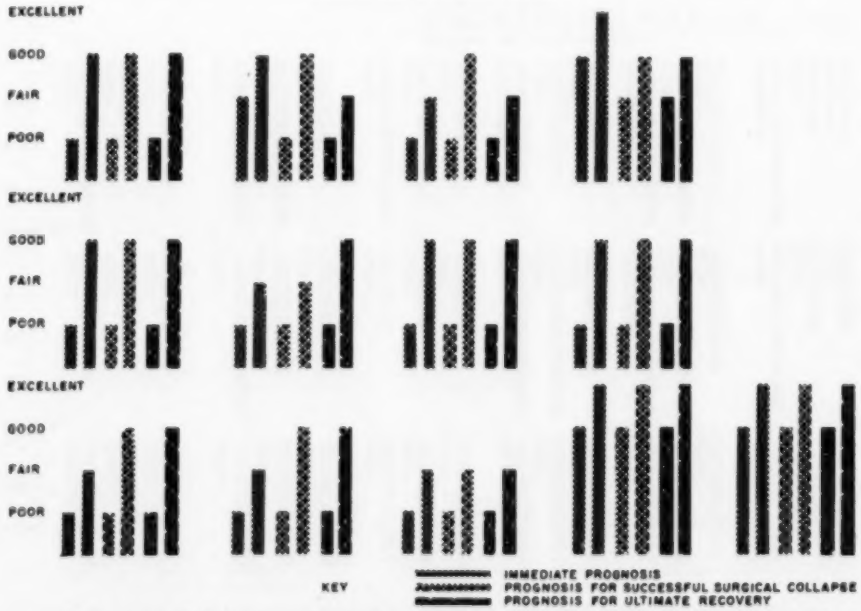


Table IV

THE EFFECT OF STREPTOMYCIN UPON PROGNOSIS OF PATIENTS RECEIVING PNEUMOTHORAX



Each group of six bars represents the prognosis for one patient, the first bar of each pair the prognosis prior to starting streptomycin, the second the prognosis when streptomycin had been given.

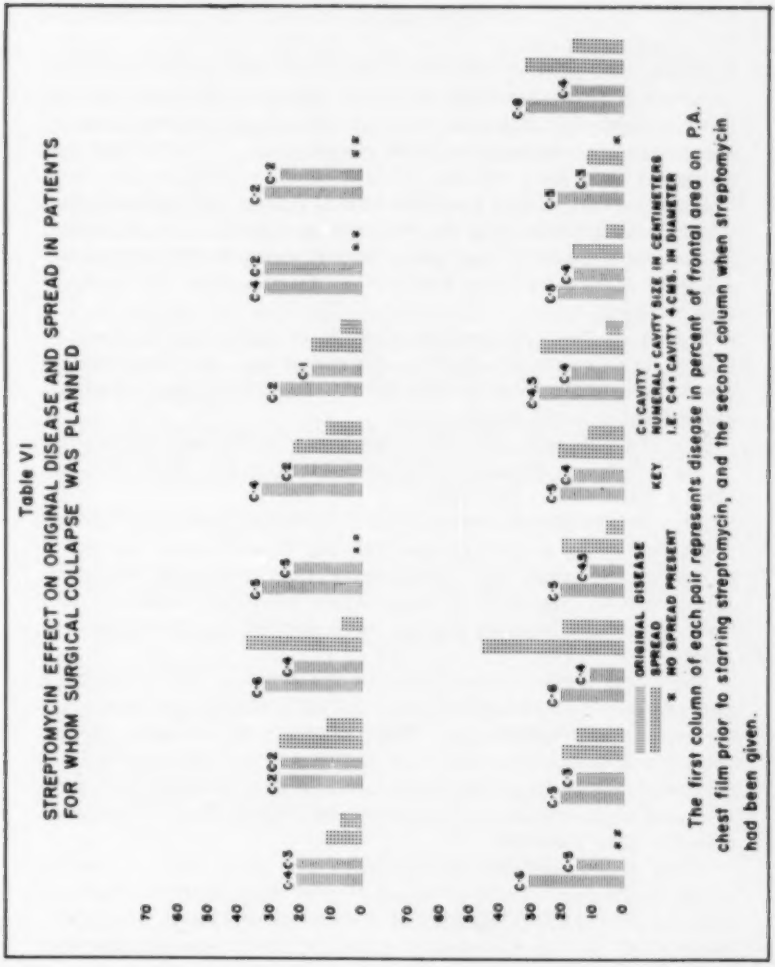
Table V

THE EFFECT OF STREPTOMYCIN UPON PROGNOSIS WHEN SURGICAL COLLAPSE WAS PLANNED

Each group of six bars represents the prognosis for one patient, the first bar of each pair the prognosis prior to starting streptomycin, the second the prognosis when streptomycin had been given.

Table VI

STREPTOMYCIN EFFECT ON ORIGINAL DISEASE AND SPREAD IN PATIENTS FOR WHOM SURGICAL COLLAPSE WAS PLANNED



The first column of each pair represents disease in percent of frontal area on P.A. chest film prior to starting streptomycin, and the second column when streptomycin had been given.

the patient's respiratory adequacy or his life through the procedure or its complications.

(c) *Ultimate Prognosis:* The estimated prospect of the patient reaching an arrested status.

Results

GROUP I: *Patients Receiving Streptomycin and Pneumothorax.*

Of the 13 patients in this group, 11 were far advanced and two were moderately advanced. The percentage of involved lung on the posterior-anterior chest film ranged from 20 to 75 per cent as shown in Table I.

Six of the 13 patients had tuberculous pneumonic consolidation. Previous experience with the therapy of tuberculous pneumonia has led us to expect a poor result by any method of management. All were sputum positive. The immediate prognosis was grave in nine patients.

The 13 patients received an average of 124 grams of streptomycin. The maximum amount was 207 grams, the minimum 45 grams. Treatment days ranged from 60 to 120 with most patients being treated for 91 days.

Streptomycin administration was begun about two weeks prior to the institution of pneumothorax in 11 cases and after pneumothorax initiation in two cases.

The effect of pneumothorax upon the original disease and spread could not be accurately gauged because of the associated pneumothorax. However, the impression is that resolution was more rapid with streptomycin in those cases where consolidation had been seen first than in similar cases treated by pneumothorax alone.

There was initial improvement in the physical condition of all patients as manifested by return of appetite, return of temperature to normal, and weight gain. The prognosis for collapse without complications was improved in all patients. The ultimate prognosis was regarded as improved in all cases. Seven patients who were regarded as poor ultimate risks improved to good status with streptomycin (See Table IV).

Three years after the beginning of the study, four of the 13 patients are dead. Three of these died of pulmonary tuberculosis and one in a mental hospital of a cause unrelated to her tuberculosis. Of the nine surviving patients, seven are classified as arrested and two are quiescent (See Chart I).

Three patients died of pulmonary tuberculosis within the first year of the study. Two of these never achieved an effective pneumothorax because of lower lobe disease and inoperable adhesions. Both of these patients had tuberculous pneumonia. The other

patients had effective control of disease on one side with pneumothorax but progression occurred on the contralateral side which could not be treated with pneumothorax because of pleural symphysis. Progression of disease on this side occurred during a second three month course of streptomycin.

Of the nine living patients, one (M.R.), is still hospitalized two years after her treatment was initiated and is now sputum negative and classified as quiescent. She developed empyema one month after completion of a 91 day course of streptomycin. This patient was the only one of the 13 to develop empyema. Initially there had been complete consolidation of the left lung. The empyema subsequently cleared. The lung, however, remained atelectatic and the pleura much thickened. Presently a thoracoplasty seems indicated to obliterate the pleural cavity and maintain collapse of the lung.

A second patient who was given oleothorax because of progressive obliteration of the pneumothorax space, had reactivation of her disease 13 months following discharge from the hospital and is now classified as quiescent.

The other seven patients have all reached the status of arrested following discharge from the hospital. They have been followed since discharge for periods ranging from 17 to 24 months.

CHART I

Status of Patients in November 1949, Who Received Streptomycin Between November 1946, and June 1948.

Group I—Patients Receiving Streptomycin and Pneumothorax.

Arrested			7
Apparently Arrested			(1)*
Quiescent			2
Frankly Active—Improved			0
Frankly Active—Unimproved			0
Dead	Tuberculosis	3	
	Other Causes	1*	4
TOTAL			13
Discharged by Staff	Alive	8	
	Dead	4	12
Hospitalized			1
TOTAL			13

*This patient died of a psychosis after her pulmonary tuberculosis had reached the stage of apparently arrested.

GROUP II: *Patients Receiving Streptomycin for whom Surgical Collapse was Planned.*

There were 17 patients in this category. All of them had far advanced tuberculosis. The total involvement ranged from 25 to 65 per cent of the frontal area of the lung in the posterior-anterior film of the chest (See Table II).

Originally none of these patients would have been considered for thoracoplasty. Eleven of them because of extensive exudative and caseous disease associated with fever and/or recent progression. Five had too extensive homolateral disease or uncontrolled contralateral disease; and one had tuberculous bronchitis.

These patients received from 71 to 240 grams of streptomycin with an average amount of 124 grams. The streptomycin effect was more pronounced upon spread than upon the original disease. The over-all average decrease in spread as measured on the posterior-anterior chest x-ray film was 51 per cent as compared to a 28 per cent decrease in the original disease. No cavities were observed to close under streptomycin therapy alone in this group (See Tables V and VI).

In addition to the x-ray evidence of clearing, all patients showed some improvement in their physical states such as return of temperature to normal, weight gain, and improvement in appetite. Eleven of the 17 patients became good or excellent candidates for major surgical collapse after streptomycin therapy. Six of the remaining seven improved to the point where they were considered only fair candidates for major chest surgery (See Table V).

Ten of the 11 patients completed the program of major surgical collapse. Nine thoracoplasties were done and one lobectomy with contralateral extrapleural pneumothorax.

At the present time, five of the 17 patients have died of progressive tuberculosis. Seven have reached and maintained a status of apparently arrested or better. Four are now classified as quiescent, three of these having completed surgical collapse. One patient is now classified as frankly active, improved (See Chart II).

In addition to the 10 patients who had surgery completed, chest surgery was begun on two other patients. One died of massive pulmonary hemorrhage despite the completion of four stages of thoracoplasty.

Because of pulmonary hemorrhage and spread, thoracoplasty was stopped after one stage in the other patient. Another eloped prior to the actual institution of surgery. Two patients, after completing 91 days of streptomycin, were thought good risks for surgery but before operation developed acute pneumonic spread and died within six to eight weeks.

Two patients showed initial improvement during a 91 day course of streptomycin, one of these, a female, to the point where surgery was considered possible. However, extensive bronchogenic spread occurred while receiving streptomycin. She died some nine months after the beginning of streptomycin administration with advanced tuberculosis. The other patient never improved enough to render surgery advisable and died with extensive pulmonary tuberculosis 13 months after the beginning of streptomycin therapy (See Chart II).

GROUP III: *Patients Receiving Bed Rest and Streptomycin.*

The patients in this group were not comparable to the other two groups. In general they would be regarded as the hopelessly advanced patients. No comparison is intended with results obtained by the combined use of collapse therapy and streptomycin in the other two groups. The results of the use of streptomycin in this group of patients are presented for what information they give

CHART II

Status of Patients in November 1949, Who Received Streptomycin Between November 1946, and June 1948.

Group II—Patients Receiving Streptomycin for Whom Surgical Collapse was Planned.

Arrested				5
Apparently Arrested				2
Quiescent				4
Frankly Active—Improved				1
Frankly Active—Unimproved				0
Dead				5
TOTAL				17
Surgery Completed				10
Surgery not Completed				7
1. Surgery begun but not completed			2	
2. Surgery feasible but not begun	Spread	3		
	Eloped	1	4	
3. Surgery not feasible			1	
Discharged by Staff	Alive		7	
	Dead		5	12
Eloped				1
Hospitalized				4
TOTAL				17

concerning the actual effect upon symptoms, the disease present, the salvage rate, and the public health aspects.

There were 16 patients in this group. The type, distribution, or extent of disease or the lack of an adequate pleural space prevented the use of collapse therapy on these patients. They were given streptomycin with the hope that some other therapy might subsequently prove possible. All patients had far advanced disease. Fourteen of the 16 had over 50 per cent involvement of the frontal lung area. One with a basal cavity and a contralateral thoracoplasty was placed in this group because of a low breathing capacity which rendered collapse therapy extremely hazardous. The percentage of involved lung was not comparable to the other patients (See Table III). Seven had cavities measuring from 6 to 10 cm. in diameter.

These patients received from 68 to 225 grams of streptomycin, the average being 116 grams. The immediate prognosis which was poor in 13 was improved to fair to excellent in 12 and not improved in one.

The staff believed that the possibility of giving collapse therapy was improved in three cases and unimproved in 12. One patient had miliary tuberculosis.

There was no effect upon the original disease in 11 patients, a limited effect in four, and a marked effect on the one with miliary tuberculosis who showed complete x-ray film clearing. Some resolution of spread occurred in five of the eight cases in which it was considered present.

CHART III

Status of Patients in November 1949, Who Received Streptomycin Between November 1946, and June 1948.

Group III—Patients Receiving Bed Rest and Streptomycin.

Arrested			1
Apparently Arrested			1
Quiescent			1
Frankly Active—Improved			0
Frankly Active—Unimproved			1
Dead			12
TOTAL			16
Discharged by Staff	Alive	3	
	Dead	12	15
Hospitalized			1
TOTAL			16

Twelve of these 16 patients have died after periods ranging from four to 24 months following the initiation of streptomycin therapy. Two have been discharged, one is classified as arrested and the other as apparently arrested. One improved so much that she could be considered for thoracoplasty but developed dementia praecox and was transferred to a mental hospital where thoracoplasty is now feasible.

One patient has progressed 26 months after streptomycin therapy to a hopelessly advanced state despite a second 90 day course (See Chart III).

All of these patients except one showed subjective improvement at some time during the initial period of streptomycin administration.

Discussion

The use of streptomycin in conjunction with pneumothorax in patients with pneumonic tuberculosis in this comparatively small series of patients contributed to an improved salvage rate and fewer complications over previous experience with pneumothorax alone. The streptomycin was started prior to pneumothorax in 11 cases and after in two cases. No significant differences in the end result or in the incidence of complications could be determined in such a small series. Subsequent experience with patients not included in this study indicate that results are apparently better where streptomycin is begun prior to or in conjunction with the institution of pneumothorax. Furthermore, where streptomycin is given after the development of empyema its effect is limited. The bacteriostasis and the tendency to regression of lesions under streptomycin therapy is believed to be the important factor in the improved results obtained with the combination of streptomycin and pneumothorax. None of these patients showed tuberculous bronchitis that could be visualized on bronchoscopy. Where this is present, the need for streptomycin prior to pneumothorax would appear to be definite. Hyman, et al.[2] reported somewhat similar results in patients showing a wider range in extent of disease.

Streptomycin appeared to be especially useful in that group of patients being prepared for surgical collapse therapy. All in this category save one reached a state wherein surgery became feasible. This was brought about by a return of the temperature to normal when fever was present (10 cases), resolution of much of the exudative disease (all cases), weight gain or stabilization (all cases), and decrease in cough and amount of expectoration (16 cases).

Proper timing of surgery seems to be of the utmost importance in this group of patients. Two of them improved to the point where surgery was feasible but showed rapid progression of disease while

awaiting surgery and not receiving streptomycin. Subsequently, we maintained patients on streptomycin up to and during surgical collapse. Even when maintained on streptomycin patients may reach an optimum degree of improvement and subsequently deteriorate while receiving streptomycin. Thus, it is important to institute collapse therapy at the point of maximum improvement and prior to development of streptomycin resistance. Steinbach et al.[3] reported two cases prepared for thoracoplasty with streptomycin who had contralateral disease.

The effect of streptomycin in the group of patients who were unable to obtain collapse therapy was primarily symptomatic. This was reflected in the initial decrease in cough and expectoration, feeling of well-being, decrease in fever, and improved appetite. However, this was temporary in nature and progression of disease occurred in 13 of the 16 patients, 11 of whom were on streptomycin at the time this progression occurred.

This raises the question of the advisability of giving streptomycin to patients in whom there is no likelyhood of eventual cavity closure because of the possibility of infecting others with streptomycin-fast organisms.[4]

It was our impression that the duration of hospitalization was prolonged. This would tend to increase the possibility of unauthorized discharges in patients in better condition than those in this study. These patients would spread infection with acid-fast organisms in the community.

SUMMARY

1) Streptomycin when administered with pneumothorax to a group of 13 patients with acute exudative and pneumonic tuberculosis caused a decrease in complications, accelerated improvement, and better end results than expected from pneumothorax alone. Three died of progressive tuberculosis in whom an effective pneumothorax could not be obtained.

2) In a group of 17 patients for whom surgery was contra-indicated because of fever, type and extent of disease or contralateral disease, 16 improved to the point where surgery became feasible following streptomycin administration. Twelve of these had surgery begun and 10 had surgery completed.

3) Within two and one-half years after streptomycin was administered to the first of 16 patients for whom no collapse therapy was possible, 13 had died and one remained frankly active, unimproved. Two of these patients reached a status of apparently arrested or better.

4) The optimum time for the administration of streptomycin in

conjunction with pneumothorax would appear to be prior to or in conjunction with the initiation of pneumothorax.

5) In preparing patients for major chest surgery, the optimum time is at the point of maximum improvement or as soon as surgery becomes feasible. This is because of the possibility of subsequent progression of disease with or without streptomycin.

RESUMEN

1) La estreptomicina, administrada con el neumotórax a un grupo de 13 pacientes con tuberculosis exudativa y neumónica aguda, causó una disminución de las complicaciones, aceleró la mejoría y dio majores resultados finales que lo que se podía esperar con el neumotórax solo. Murieron de tuberculosis evolutiva tres casos en los que no se pudo obtener un neumotórax eficaz.

2) En un grupo de 17 pacientes en los que estaba contraindicada la cirugía debido a fiebre, tipo y extensión de la enfermedad o enfermedad contralateral, 16 mejoraron hasta tal punto, después de la administración de estreptomicina, que fue posible la intervención quirúrgica. Se comenzó la cirugía en 12 de ellos y en 10 se completó.

3) En los dos años y medio subsiguientes a la administración de estreptomicina al primero de 16 pacientes, en quienes no era posible la colapsoterapia, 13 habían muerto y uno permanecía francamente activo y sin mejoría. Dos de esos pacientes llegaron a un estado de por lo menos aparentemente estacionados.

4) El tiempo óptimo para la administración de la estreptomicina en conjunción con el neumotórax parece ser antes o simultáneamente a la iniciación del mismo procedimiento de colapso.

5) Al preparar los enfermos para cirugía mayor del tórax la oportunidad óptima operatoria es en el momento de la mejoría máxima, o tan pronto como la cirugía es practicable. Esto con motivo de la posible evolutividad de la enfermedad, ulteriormente, con o sin estreptomicina.

RESUME

1) La streptomycine associée au pneumothorax a été appliquée à un groupe de 13 malades, atteints de tuberculose, aigue, exsudative, et pneumonique. Cette association a permis une diminution des complications, une accélération de la guérison, et de meilleurs résultats dans l'ensemble que ceux que l'on pouvait attendre du pneumothorax isolé. Trois malades pour qui un pneumothorax efficace n'a pas pu être obtenu moururent de tuberculose progressive.

2) Dans un groupe de 17 malades, la fièvre, le type et l'étendue des lésions ou une localisation contro-latérale créaient une contre-

indication chirurgicale; seize d'entre eux s'améliorèrent au point que l'intervention devint réalisable, à la suite du traitement à la streptomycine.

3) Si l'on envisage un groupe de 16 malades pour qui la collapsothérapie ne fut pas possible, et qui furent traités par la streptomycine d'emblée; en deux ans et demi, 13 sont morts et un ne put guérir et garde une tuberculose franchement évolutive. Deux de ces malades sont améliorés ou apparemment stabilisés.

4) Le moment le plus favorable pour l'administration de la streptomycine associée au pneumothorax se place soit avant l'institution de la collapsothérapie, soit parallèlement à elle.

5) Dans la préparation des malades pour la grande chirurgie thoracique, le moment le plus favorable est soit celui où l'amélioration est à son degré maximum, soit celui où l'opération devient réalisable. Cette position doit être prise en fonction de la possibilité d'aggravation ultérieure de la maladie, que ce soit avec ou sans l'antibiotique.

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Postural Rest in Pulmonary Tuberculosis

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Of the countless methods suggested and tried in the treatment of various forms of tuberculosis, that which is most recognised and approved is rest.

"Bed rest" implies an infinite variety of standards. To some physicians and patients its limitations are not breached even by frequent trips to the bath-room. This is bed rest in name only, and is of little therapeutic value. This article, however, is not a discussion of bed rest, which has already been most adequately dealt with on numerous occasions, but of an aspect of it, namely postural rest in pulmonary tuberculosis.

The application of posture in tuberculosis is not a new idea but is a neglected one. In this hospital, since the introduction of this form of therapy in 1947, the results have been so overwhelmingly more superior to bed rest alone or combined with collapse therapy, that, though scientifically it is difficult to make a truly controlled experiment, it has gained, I think, our universal enthusiasm.

In 1916 in the Journal of the American Medical Association, Webb, Forrester and Gilbert[1] drew attention to the neglect of the simple procedure of postural rest in the treatment of pulmonary tuberculosis. Again in 1921[2] they reported more than 200 excellent results. The failures they encountered were in patients either too far advanced with bilateral disease, or in those who failed to carry the treatment out faithfully. They noted that it was insufficient to instruct patients merely to rest in bed, and overlook the fact that they will more naturally tend to lie on the least affected side, so putting an added burden on the more diseased organ, and reducing the ventilation in the dependent lung. From observations they made under the fluoroscope, the ribs of the recumbent lung were close together and moved less than those over the uppermost lung; the diaphragmatic excursions were at first greater on the dependent side, but this soon settles. They observed hyperemia of the dependent lung after prolonged rest on the affected side, and noted that the shift of the heart and mediastinum to the affected

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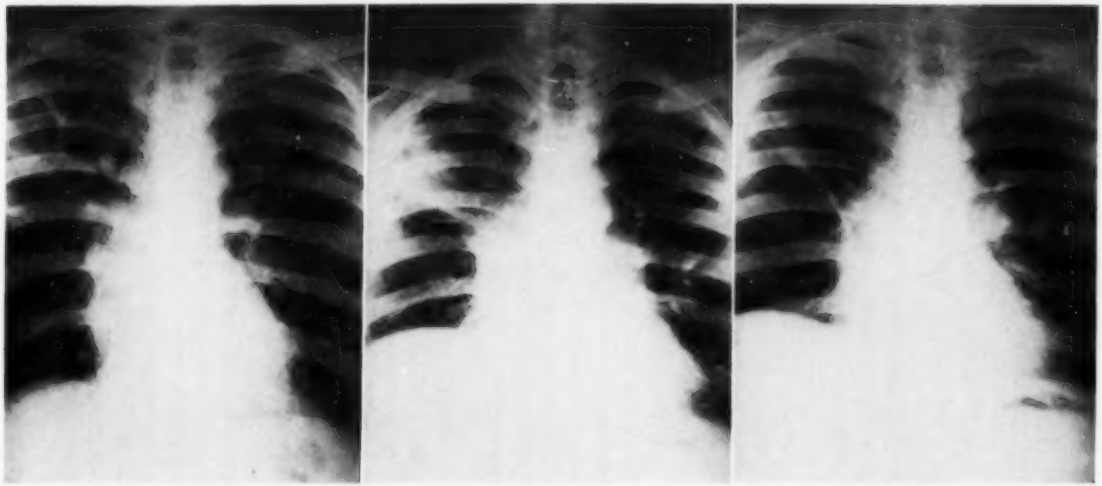

FIGURE 1a FIGURE 1b FIGURE 1c

Figure 1a: S., European male, aged 25 years, with tension cavities in right upper lobe. — *Figure 1b: S.*, after three months on postural rest alone. Sputa were negative for tubercle bacilli.— *Figure 1c:* S., showing cavity closure maintained after a year of returning to work as a Sanitary Inspector.

side occurred rapidly, producing relaxation of tissues and the effect of collapse therapy in the dependent lung.

For cases of bilateral disease rest on the back was advocated, with bags of shot placed over the upper lobes.

No mention of the tilted position of the bed was made.

Peck[3] in a short discourse on the Modalities of Bed Rest, presented before the meeting of the Illinois Trudeau Socity in 1946 mentioned in passing that in pursuit of the three fundamental modalities of rest, namely adequate drainage, muscular relaxation and mental repose a brief trial of the elevated foot position was made to improve drainage, but abandoned when it was realized that the problem was not so much elimination of sputum from the trachea and larger bronchi, as from the involved broncho-pulmonary segments where disease had most severely interfered with the normal cleansing mechanism. He advocated a continual change in position from supine to prone and both lateral positions at intervals throughout the day; a change being made roughly every half hour to permit drainage from diseased areas and prevent stasis of contaminated secretions in normal areas; his contention being that the unreasoning adherence to the state of immobility fails to take into account the need for pulmonary and cavity drainage, adequate drainage being the basic principle of treatment in all other inflammatory processes; and, since cavitation is known to occur, with noticeable predeliction posteriorly in the chest, the postero-lateral segment of the upper lobe, and the dorsal segment

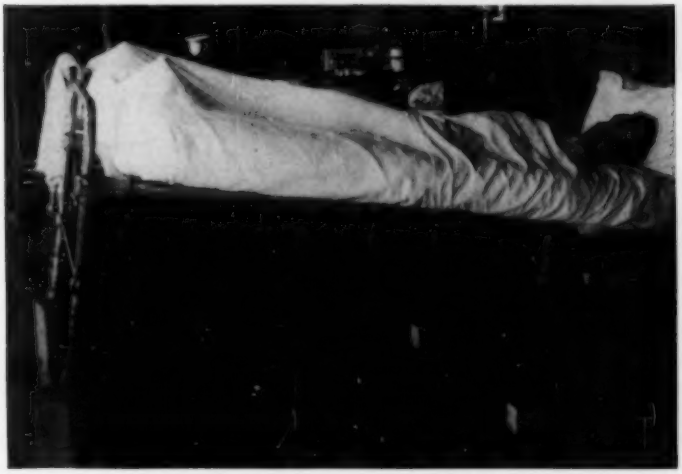

FIGURE 2: Patients on postural therapy.

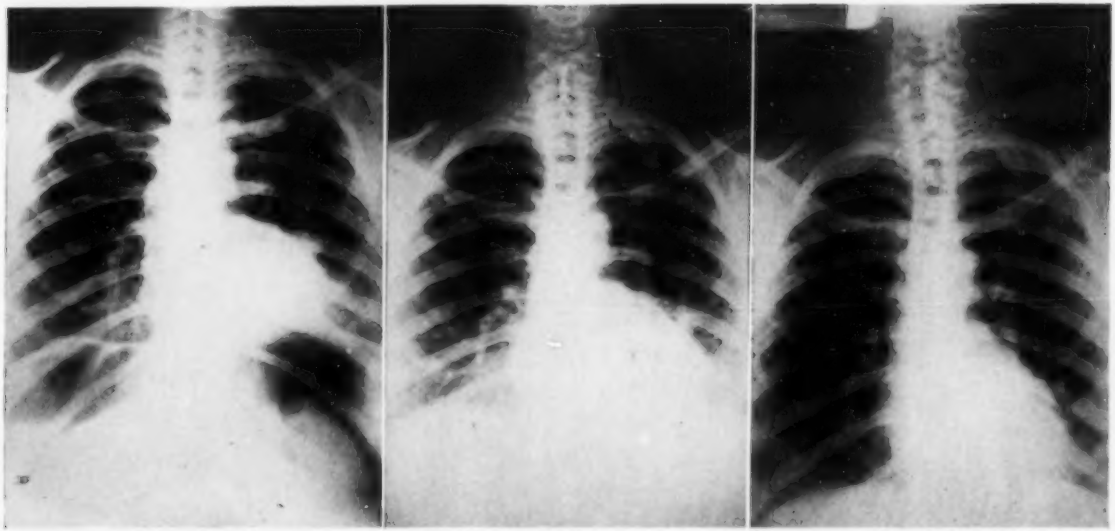

FIGURE 3a FIGURE 3b FIGURE 3c

Figure 3a: M.D., African female, aged 32 years. After a year of bed rest with a left phrenic crush and pneumoperitoneum, she still had a large left apical cavity and was considered for lobectomy.—*Figure 3b:* M.D., after three months on postural rest the cavity is closing. She became sputum negative two months later and maintained the postural therapy for six months.—*Figure 3c:* M.D., three months after discharge; her cavity remains closed and gastric contents are negative for tubercle bacilli on culture.

of the lower lobe being the most commonly involved, the problem of drainage in a recumbent patient depends on explosive and damaging cough.

This appears to be logical reasoning, yet from observation of the response of many cases of upper lobe cavitation, and the often dramatic cessation of cough in these cases, it would seem that gravity plays a less important part in the drainage of tuberculous cavities than one would suppose.

Physical and Physiological Principles of Postural Rest

The method of applying postural rest varies a little from ward to ward, depending on how strongly the physician in charge feels about the principles involved, and which principle he considers the more important.

Dilwynn Thomas, in a personal communication considered that the secretions dammed up in the dependent cavity and became fibrosed. We have not seen a case which suggested that this was the mechanism of healing and cavity closure. In our experience four principles are thought to play a part in the success of this form of rest.

Firstly, by tipping the foot of the bed to an effectively high angle of about 20 degree, providing the patient maintains the position for long periods, there is an apparent hyperaemia in that part of the lung which is normally least well supplied with blood on account of its relative immobility during pulmonary excursions, viz, the superior retroradicular area, which is also that most frequently involved in pulmonary tuberculosis.

Secondly by positioning the patient with unilateral cavitation onto the affected side, there is a restriction of movement of the chest wall on that side, and a movement of the heart and mediastinum producing relaxation of pulmonary tissues. The weight of abdominal organs on the diaphragm may enhance this splinting effect.

Thirdly, drainage, even from apical cavities, appears to be improved. Salkin, Cadden and McIndoe declare that only a small number of cavities have dependent drainage, and that the majority of cavities drain from bronchi arising from the upper parts of the cavity wall. From observation of the rapid disappearance of tension cavities under this postural regime, it is suggested that in tracheo-bronchial tuberculosis with obstruction of the outflow of air from a segmental bronchus, the change in position may either render the bronchus patent or block it entirely, so producing cavity closure, which, if maintained for long enough is permanent. (See Fig. 1a, b end c).

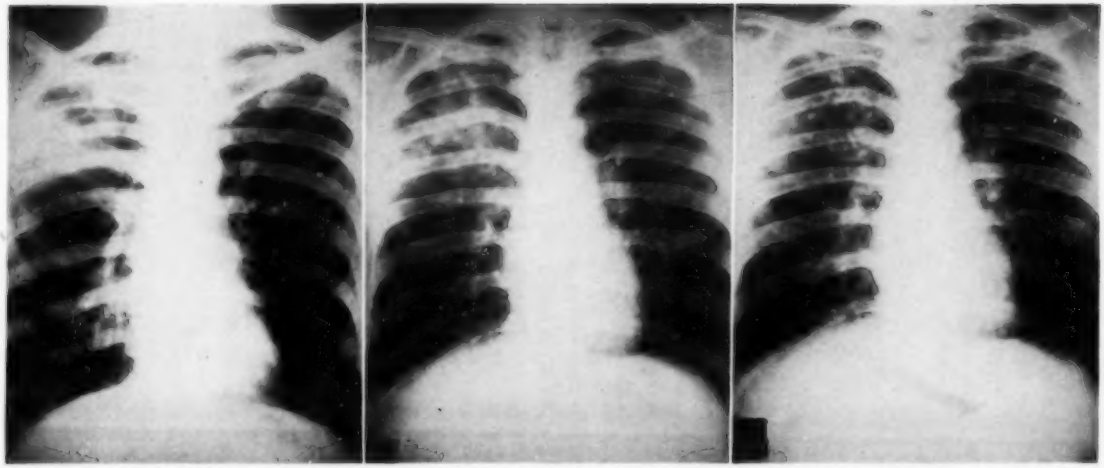

FIGURE 4a FIGURE 4b FIGURE 4c

Figure 4a: B.P., European boy, aged 19 years. Admitted with a positive sputum; he had a short history and was febrile. Streptomycin was withheld because of acute shortage.—*Figure* 4b: B.P., six weeks after admission. Postural therapy was the only treatment he received. His sputum was negative and has remained so.—*Figure 4c: B.P.*, a year later and three months after discharge. Postural therapy had been maintained for six months.

Method of Applying Postural Rest

The methods of applying the principle of posture to patients suffering from pulmonary tuberculosis depends partly on what the individual regards as the most important factor on which its success depends. Where the theory of hyperaemia is regarded as the most important it would be considered sufficient that the patient maintains the tilted position for almost 24 hours a day, being allowed freedom to move from side to side as inclination dictates. The majority of patients with unilateral cavitation are encouraged to lie for most of the day on the affected side, to effect the partial immobilization.

The foot of the bed is tilted, on solidly built blocks, to an angle of about 20 degrees. This degree of tilting may be gradually achieved over a period of several days on graduated blocks. Where patients at first complain of insomnia, or dyspepsia after meals, the bed may be brought down for the night or for a short period after meals till their bodily mechanics have adjusted themselves, and their enthusiasm and optimism bolstered up sufficiently for them to accept the treatment in its entirety. (See Fig. 2).

For the average case the posture should be maintained for almost 24 hours a day. The patient is permitted a small pillow under the head. He should learn to eat, read and write in this position. Often these latter activities are so hampered that somnolence is easier. After an initial period of complete bed rest it has been our habit to allow patients to attend to the major operations of their toilet once a day, in the bathroom, and when progress indicates, to have full bathroom privileges while on postural therapy. Giddiness, experienced when the verticle position is assumed, makes them quite anxious to return to their tilted bed.

The tendency of patients to sit up against the bars of the bed or to raise their shoulders on doubled pillows makes a parody of the whole procedure and calls for intensified efforts on the part of the doctor and staff to make the patient wish to help himself. It is often surprisingly difficult.

Patients who have become quiescent and fully convalescent have been advised to maintain the tilted position at night after return home. Some, who have returned to work at a stage of unstable but improved disease, as a result of economic pressure upon their families, have continued to improve and heal to an extent quite unexpected and convincing; some postural rest is better than none at all.

Indications

The indications for this form of therapy are most elastic and are, seemingly, limited only by the contraindications.

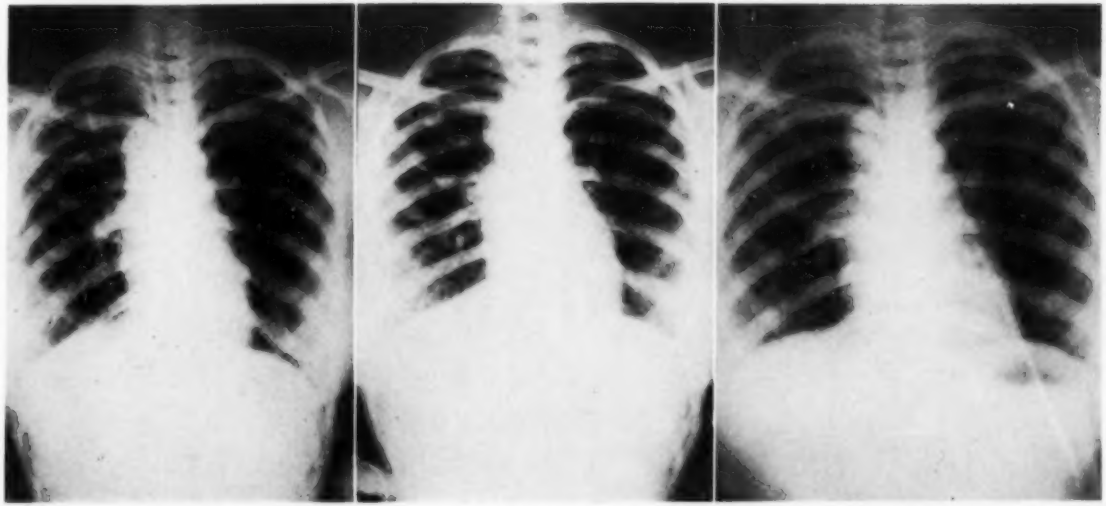

FIGURE 5a FIGURE 5b FIGURE 5c

Figure 5a: G.K., a young African female with acute exudative tuberculosis and cavitation of the right upper lobe.—*Figure 5b:* G.K., after three months postural rest the cavity is much reduced and the infiltration is clearing.—*Figure 5c:* G.K., after six months postural rest. She started to get up at this stage and has remained well during almost two years following.

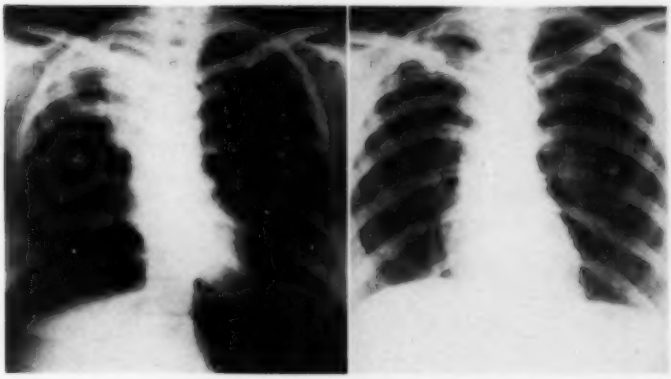

FIGURE 6a FIGURE 6b

Figure 6a: Mrs. F., European female, aged 28 years. Rapid spread of right upper lobe infiltration with cavitation, while on bed rest and pneumoperitoneum, which was abandoned and the patient put on postural rest.—*Figure 6b:* Mrs. F., nine months later and shortly after discharge. Sputa were negative and have remained so during brief follow-up period.

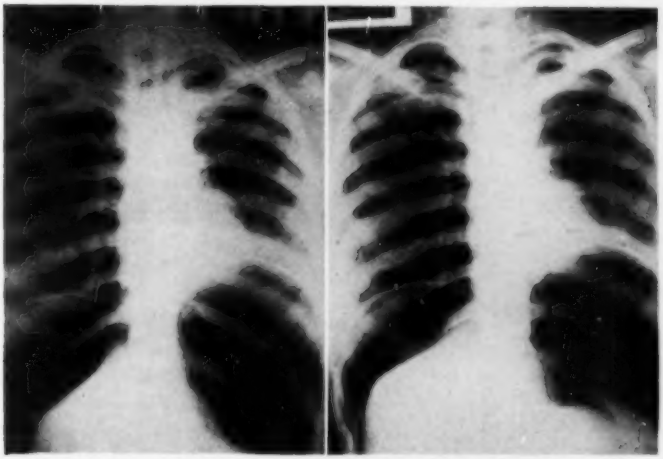

FIGURE 7a FIGURE 7b

Figure 7a: S.F., a colored female, aged 17 years. After a year of bed rest, left phrenic paralysis and pneumoperitoneum, she still has giant apical cavities on either side. Bronchoscopy showed tuberculous tracheobronchitis.—*Figure 7b:* S.F., after 42 days streptomycin and postural rest cavities are smaller, no longer visible on the right. She continues on postural rest and P.A.S. and progress is still encouraging three months later.

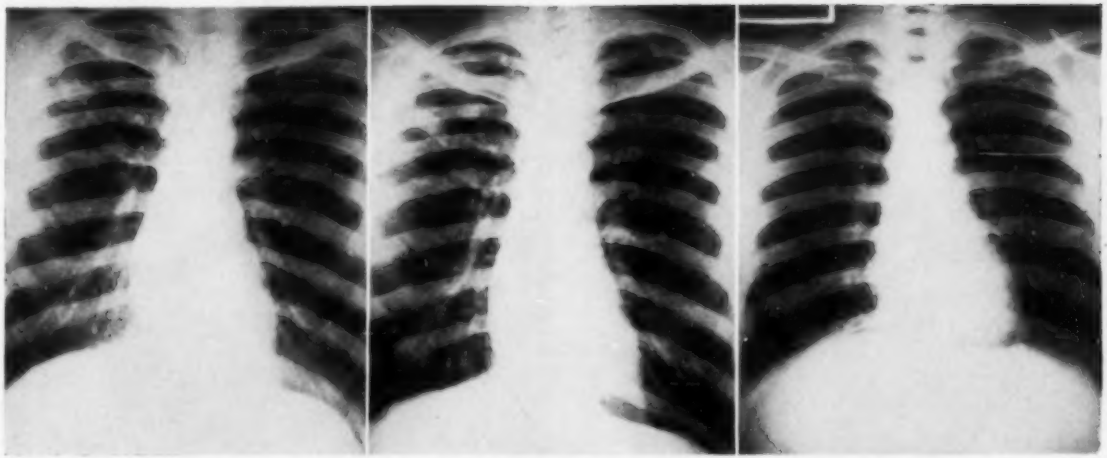

FIGURE 8a FIGURE 8b FIGURE 8c

Figure 8a: B.S., European male, aged 25 years, with right subclavicular infiltration and cavity. Sputum was positive.—*Figure 8b:* B.S., after one month on postural rest at home, prior to admission to hospital.—*Figure 8c:* B.S., after four months on postural rest. Gastric contents were negative for tubercle bacilli. A right phrenic crush was done prior to allowing the patient up. He remains well a year later.

From the minimal infiltrations to gross bilateral disease there is seldom any reason why postural therapy should not be used as part of the treatment programme. In itself it is safe and free from possible complications and, we are convinced, more effective than simple bed rest.

A trial of postural therapy in the initial waiting period, during which the patient is assessed, may save a patient the dangers of collapse therapy; or, where collapse therapy already exists, with only partial success, postural therapy may save them the additional methods of collapse employed to augment an unsuccessful result, and the inevitable curtailment of respiratory function may be circumvented. Major surgery was avoided in the case illustrated in Fig. 3a, b and c, where lobectomy was being considered.

Recent acute infiltrations of one or both lungs such as might be considered suitable for Streptomycin or other Chemotherapy have shown dramatic response (Fig. 4a,b.c). In the case illustrated it is a philosophical question whether bed rest, as such, would have achieved the same result.

Upper lobe cavities have shown particularly satisfying response, of many cases only a representative few can be published (See Figure 5a,b,c, and 6a,b).

Postural rest, chemotherapy and collapse therapy should be complementary parts of the therapeutic regime. The addition of phrenic paralysis, to give more adequate relaxation of pulmonary tissue, and above all to tide a patient over the period when they are starting to get up, seems logical (Figure 7a,b and 8a,b,c).

Many patients adjust themselves shortly to their new requirements and accept with enthusiasm and optimism, reflected from those around them, the limitations imposed upon them. Some react to the enforced and uncompromising rest by a state of nervous tension and irritation. A feeling of exhaustion from lying in bed and complaints of muscular pains, which lead to constant fidgeting for relief and comfort, of insomnia and anorexia, palpitations and constipation, are frequent from those unsuited to the treatment; these patients fail entirely to have the benefits even of bed rest, even though they remain in bed and some do not even do that. It is a reflection on our approach perhaps; these patients may be better for a preliminary period of acclimatization to hospital and discipline before postural therapy is attempted.

The most definite contraindication to this form of treatment is a history of peptic ulcer, or persistent dyspepsia during the treatment. A quiescent ulcer may become active as a result of posture being maintained.

Asthma and emphysema are not always contraindications to

the therapy, indeed, Elwell[4] has treated a variety of chronic pulmonary conditions, including asthmatics and cases of right heart failure, on postural therapy with encouraging results. If the patient is brought to the point of desiring the treatment himself, no discomfort is noted in many cases. Elwell maintains that in non-tuberculous asthmatics an attack can often be aborted or prevented by the assumption of the tilted position.

A failing left heart makes the maintenance of postural treatment, as described here, impossible. Pregnancy however can go to full term in the normal way, with the foetal position unaffected by months spent in the tilted position.

It has been our custom till recently to interrupt the postural treatment temporarily when a patient has had an haemoptysis or heavily blood stained sputum. Elwell[4] however, reports that he has, for a long while, maintained the position during haemoptysis with nothing but benefit, and finds the dreaded spread from bronchial embolism much less frequent.

Occasionally the cavity drainage seems to be interfered with, rather than improved in a particular case, which in all other respects appears similar to many other successfully treated cases, and the patient becomes toxic and febrile, cough may increase and sputum be retained. One should be prepared to abandon the treatment when this occurs. Diminution of cough and of troublesome wheezing of which some patients complain, is a noticeable feature of the early days on postural therapy.

SUMMARY

From our short experience of this form of treatment, and despite the relatively few patients who give their complete co-operation it has been the impression throughout the hospital that the response to postural rest far outweighs that of ordinary bed rest and appears to deserve more wholehearted approval and aclaim than any other single method of treatment.

We are indebted to Mrs. Barton-Hoare for doing the photographic work connected with this article.

RESUMEN

Basada sobre nuestra corta experiencia con este tratamiento, y a pesar de que relativamente pocos pacientes prestaron su completa cooperación, la impresión a través del hospital ha sido que la respuesta al descanso postural es mucho mayor que al descanso en cama ordinario y que parece merecer una aprobación y aplauso generles que cualquier otro método de tratamiento.

RESUME

Les auteurs concluent, après leur courte expériense de ce moyen de traitement que, malgré le nommbre relativement peu élevé de malades qui offrirent une coopération vraiment totale, les résultats du repos en position de drainage sont largement supérieurs au simple repos au lit. Ce mode de traitement semble réserver plus de succès que toute autre méthode.

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The Treatment of Giant Tuberculous Cavities*

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The purpose of this paper is an attempt to determine whether thoracoplasty or resection is the treatment of choice for the giant cavity in pulmonary tuberculosis. A series of 42 consecutive thoracoplasties performed between January 1, 1945, and January 1, 1947, is compared with a series of 20 consecutive cases of pulmonary resection performed between April 3, 1946, and May 18, 1947. In all cases giant cavitation was the main indication for surgery. All operations were performed at the Missouri State Sanatorium, Mount Vernon.

By a giant cavity we understand a cavity not less than four centimeters in diameter. A majority of the patients had cavities considerably larger, some occupying a whole lobe. In none of the patients were the cavities situated in the lower lobe. An attempt to divide the cavities into the tension and non-tension varieties has not been done because one cannot always be certain from the roentgen appearance that positive intra-cavity pressure exists and needling of the cavity had not been done in any of our cases. Furthermore, a cavity which is under tension one day may have free drainage the next day. However, there can be no doubt that a large percentage of the giant cavities in either of the groups have been of the tension type at some time or other.

There has been considerable controversy concerning the treatment of giant cavities. This is especially true when dealing with the tension type. When a tension cavity is suspected, bronchoscopy should be done and if intra-bronchial tuberculosis is diagnosed, a trial of streptomycin therapy is indicated. In the majority of cases, streptomycin will heal or improve this condition and the cavity may decrease in size. Whenever this occurs, pneumothorax or thoracoplasty should be considered. In some cases temporary phrenic nerve paralysis and/or pneumoperitoneum may be given a trial, especially when bilateral involvement is present. When the cavity fails to respond to streptomycin, thoracoplasty with or without streptomycin is recommended by many authors, and resection

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is reserved for the failures. However, we feel that in a few selected cases primary resection, preferably lobectomy, is justified. Unfortunately it cannot always be determined preoperatively if lobectomy is feasible and sometimes pneumonectomy is done where lobectomy was originally planned. This is because of the frequent condition of extensive tuberculous symphysis between adjacent lobes.

Material

Two series of patients are analyzed and compared. Group I consists of 42 consecutive cases of thoracoplasty in which giant cavitation was present. Twenty were females and 22 were males. Forty-one were white and one was a Negro. The youngest was 17, the oldest 57 years. The average age was 18.9 years. Preoperatively, all cases had positive sputum for acid-fast bacilli by direct smear. The operations performed were all of the modern type, multiple stage, extrapleural posterolateral thoracoplasties. The technique of the operations was uniform throughout, the entire series being performed or closely supervised by one surgeon (W.W.B.). None of the patients had streptomycin before or during surgery because this drug was not available in large amounts at that time. Nineteen had epidural anesthesia during their surgery. Twenty-three had nitrous oxide-oxygen anesthesia. The status of the contralateral lung at the time of the operation is shown in Table I, where it is seen that the patients operated upon were rather poor risks as only 40.5 per cent had no disease or inactive disease in the contralateral lung, whereas 59.5 per cent had active disease uncontrolled or controlled by pneumothorax at the time of the operation.

Group II consists of 20 consecutive cases of pulmonary resection with giant cavitation as the main indication for surgery. Twelve patients were females, eight males, and all were of the white race. The youngest was 18 and the oldest 50 years. The average age was 32.7 years. Preoperatively, all patients had acid-fast bacilli in the sputum by direct smear. The technique of the operations was uniform throughout, all resections being performed by one

TABLE I

Contralateral Lung	Thoracoplasty	Resection
Inactive Disease	15	10
Active Uncontrolled Disease	13	4
Active Disease controlled with pneumothorax or pneumoperitoneum	12	4
TOTAL	42	20

surgeon (W.W.B.). The individual ligation technique was used on the hilus and all had epidural anesthesia during surgery.

Streptomycin was used routinely one week preoperatively and was continued two to six weeks postoperatively, according to the condition of the patient. Four to six weeks following the resection a modified thoracoplasty was performed in all cases.

The operations performed were as follows: right pneumonectomy, five; left pneumonectomy, eight; right upper lobectomy, four; right upper and middle lobectomy, one; and left upper lobectomy, two.

From Table I it is seen that the patients in Group II were slightly better risks than those in Group I. Twelve (60 per cent) had no disease or inactive disease, eight (40 per cent) had active disease uncontrolled or controlled with pneumoperitoneum in the contralateral lung at the time of the operation.

Results

The present status of both groups of patients is analyzed. Those in Group I were followed for three to four years postoperatively. Only one could not be traced. Thus, there are 41 to be analyzed. None of them have later had pulmonary resection performed. Postoperatively, 24 (58.9 per cent) were arrested. There were six operative deaths (14.8 per cent). A death is considered an operative

TABLE II

Group I:	
Operative Deaths,	
Cardiorespiratory Failure	5
Spontaneous Pneumothorax contralateral side	1
Late Deaths,	
Cardiorespiratory Failure	7
Progressive tuberculosis	1
Unknown Cause	1
TOTAL	15
Group II:	
Operative Deaths,	
Bronchopleural fistula with empyema	2
Late Deaths,	
Bronchopleural fistula with empyema	1
Progressive tuberculosis	1
TOTAL	4

mortality in all patients who died within the first three months following surgery. Nine (21.9 per cent) died later. The over-all mortality was 15 deaths (36.7 per cent). Two (3.4 per cent) still have active disease. Three had spread of the disease within the first three months postoperatively. Except for these, no serious operative complications occurred.

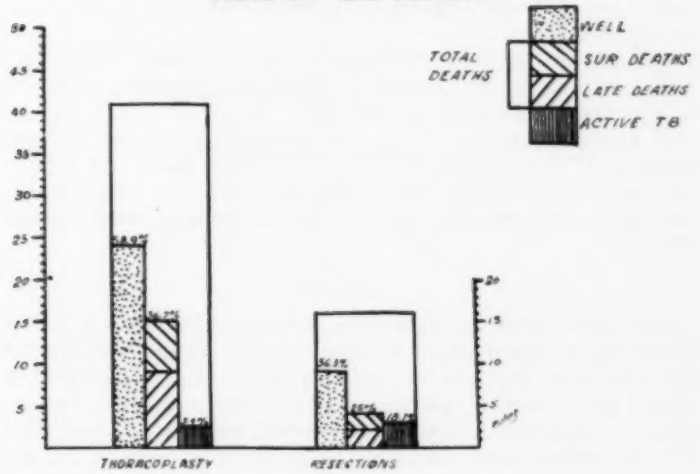
The patients in Group II were followed for 10 months to four years. We were not able to trace four. This leaves 16 cases to analyze. Nine (56.3 per cent) are arrested. There were two operative deaths (10 per cent) and two died later. Thus, the over-all mortality was four (25 per cent). Three (18.7 per cent) still have active disease. Four developed bronchopleural fistulae postoperatively. There were no postoperative spreads in this series of patients. The operative as well as later fatalities of both groups are listed in Table II.

Conclusions

Our series of cases is rather small and some patients in the resection series have not been followed a sufficient period of time. Nevertheless, we feel justified in making a few conclusions at this time.

The treatment of the giant cavity with either thoracoplasty or resection is not too encouraging. Our results were about equal with both types of treatment. However, it is our belief that pulmonary resection is preferable to thoracoplasty as treatment in the majority of cases with giant cavities. Group II had the advantage

TABLE III: END RESULTS



of streptomycin therapy at the time of operation whereas Group I did not. Group II also consisted of slightly better risk patients than Group I when the contralateral lung is taken into consideration. Still there was no great difference in the final results. (However, as can be noted from the accompanying tables, resection is the better of the two types of treatment.)

SUMMARY

Two groups of patients suffering from giant tuberculous cavities are analyzed and compared. Group I was treated with thoracoplasty and Group II with pulmonary resection. The final results were about equal. However we believe resection has some advantages.

RESUMEN

Nuestra serie de casos es más bien pequeña y algunos de los casos en el grupo de las resecciones no han sido observados por tiempo suficientemente largo. Sin embargo, creemos justificado el presentar algunas conclusiones ahora.

El tratamiento de la caverna gigante con toracoplastía o con resección no es muy alentador. Nuestros resultados son más o menos los mismos con ambos procedimientos. No obstante es nuestra creencia que la resección pulmonar es preferible a la toracoplastía en la mayoría de los casos con caverna gigante. El Grupo II tiene la ventaja del uso de la estreptomicina al tiempo de la operación en tanto que el Grupo I no la tuvo.

El Grupo II también incluyó enfermos de riesgo ligeramente mejor que el Grupo I cuando el pulmón contralateral es tomado en consideración.

Aún así no hay gran diferencia en los resultados finales. Sin embargo, como puede notarse en los cuadros anexos la resección es el mejor tipo de estos tratamientos.

Se analizan y comparan dos grupos de enfermos con cavernas gigantes. El Grupo I fué tratado con toracoplastía y el Grupo II con resección pulmonar. Los resultados finales son más o menos los mismos. Sin embargo, creemos que la resección tiene algunas ventajas.

RESUME

Les auteurs présentent une série de cas relativement peu importante. Par ailleurs, quelques malades qui ont subi une exérèse n'ont pas été suivis pendant une période suffisante. Néanmoins, ils jugent qu'ils peuvent dès maintenant émettre quelques conclusions. Le traitement des cavernes géantes, soit par thoracoplastie, soit par exérèse n'est pas particulièrement encourageant. Les ré-

sultats furent à peu près les mêmes avec ces deux méthodes de traitement.

Cependant les auteurs estiment que dans la majorité des cas de cavernes géantes, l'exérèse est supérieure à la thoracoplastie. Le deuxième groupe de leurs malades à eu l'avantage d'un traitement par la streptomycine au moment de l'opération, tandis que les malades du grupe I n'en eurent point. Si l'on considère l'ensemencement contro-latéral, il semble que le groupe II se comporta légèrement mieux que le groupe I. Bien que dans les résultats définitifs, la différence n'est pas frappant, l'exérèse est le meilleur des deux modes de traitement.

Deux groupes de malades atteints de cavernes tuberculeuses géantes sont analysés et comparés. Le groupe I a été traité par thoracoplastie et l'autre groupe par l'exérèse. Les résultats définitifs furent à peu près comparables, cependant les auteurs pensent que l'exérèse présente quelques avantages par rapport à la thoracoplastie.

Familial Pulmonary Fibrosis

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Over a period of many years there has gradually accumulated, from Iola Sanatorium and Dispensary cases, a large teaching file of interesting and instructive chest x-ray films. This file, as far as present day classification of pulmonary diseases goes, is practically complete. However, it contains a relatively similar group of cases showing bilateral symmetrical involvement where the exact etiological factor is unknown.

These teaching cases, in some instances, have had their diagnoses changed as many as three times. The great frequency with which tuberculosis was given as the initial diagnosis was probably due to its high incidence and ability to simulate any other chest disease and to too little dependence on negative tuberculin and sputum examinations. Next in frequency were broad inclusive terms like pulmonary fibrosis, chronic interstitial fibrosis, and post-infectional fibrosis. Terms such as chronic pulmonary granuloma, or chronic non-infectious granuloma were also freely used. The remaining diagnoses in this relatively homogeneous group were Boeck's Sarcoid, fungus disease, and chronic pulmonary lymphangitis. The primary etiological factor, however, was still lacking, and this fact alone did more to stimulate our investigation than any other.

Even in some of the cases where biopsy or autopsy has been done, the causative factor still remains a mystery. The pathological terms fibrosis or granuloma are inclusive ones, and when one finds them at the end of the road, unless past clinical or laboratory data is available, the primary etiological factor, or factors, remains unexplained.

Tissue repair varying as it does from complete resolution to keloid formation, the idea is entertained that perhaps such an entity as a pulmonary keloid type of response to trauma or infection is possible. Then too, there is the possibility that the lungs are the "Achilles Heel" in certain individuals or families.

With the presentation of the following familial groups, it is felt that sufficient clinical and pathological data is offered to warrant the establishing of a new disease entity, the basic etiological factor being a familial response to pulmonary trauma, of an infectional organic or inorganic nature.

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Familial Group I:

This group includes Case I (Figures 1, 2, and 3), and Case II (Figures 4 and 5), supplemented by additional family investigation.

Case I: The first and original case study began in our Out-patient Department in 1918. At this time an apparently precursory examination was negative. On the next examination a chest x-ray film—no longer available—was interpreted as follows: August 28, 1918, Right: Moderate infiltration throughout. Left: Moderate infiltration throughout. There was little change in her clinical condition on subsequent examinations, which were approximately at yearly intervals. On one examination she gave a history of "Recently having raised large mouthfuls of blood; streaked twice later; cough, slight, non-productive of sputum." November 16, 1923, a diagnosis of moderately advanced pulmonary tuberculosis was made. Several sputa were negative for tubercle bacilli. No chest x-ray film was made. A physical examination of the chest was negative June 22, 1927, but one on February 2, 1928, showed scattered rales throughout, anteriorly, and upper thirds of both lungs, posteriorly. A chest x-ray film at this examination revealed: "There is questionable slight haziness at the right apex, and thickening of apical pleura on the left. There is nothing definite enough to make a diagnosis of pulmonary tuberculosis." The next examination occurred November 27, 1935. This followed a cold for the past three weeks. X-ray film interpretation was: Right: Abnormality throughout, more marked at the apex. Left: Abnormality from the first to third ribs, posteriorly; slight, scattered, rather diffuse infiltration from the third to eighth ribs, posteriorly. The findings were considered suspicious of pulmonary tuberculosis. Sanatorium was advised. She did'nt follow this advice, and returned for a recheck February 24, 1936. Her chest x-ray findings were unchanged. A laryngeal smear revealed a few acid-fast bacilli on this examination and she entered Iola Sanatorium for the first time on March 9, 1936.

This 49 year old white, housewife, on admission gave a family history of her father dying of pulmonary tuberculosis shortly after her birth. Two sisters died of pulmonary tuberculosis, one in 1918 and the other in 1919. Occupational history was negative. The only past history of significance was the average number of chest colds. There was unexplained hoarseness since childhood. Blood pressure was 146/100. Pulse 84. Temperature 37. Diagnosis was moderately advanced pulmonary tuberculosis. Seven sputum examinations were negative. She was discharged March 20, 1936.

Out-patient Department x-ray films on May 20, August 26, and December 23, 1936, and February 19, 1937, revealed no increase in pulmonary disease. Outside of several colds, her clinical condition remained unchanged until December, 1936, when she began to complain of dyspnoea. Out-patient Department examination June 16, 1927, showed increased dyspnoea, otherwise she felt "fine." The chest x-ray film, compared with that of February 16, 1937, showed: Right: Slight but definite progression, evidenced by increased infiltration throughout. Left: Shows definite progression evidenced by increased infiltration throughout.

She was admitted to Iola Sanatorium July 6, 1937. There was no apreciable change over her previous admission physical examination. She was 11 pounds overweight. Dyspnoea was now supplemented by orthopnea. Blood pressure was 130/100. Cough was non-productive. Cyanosis in-

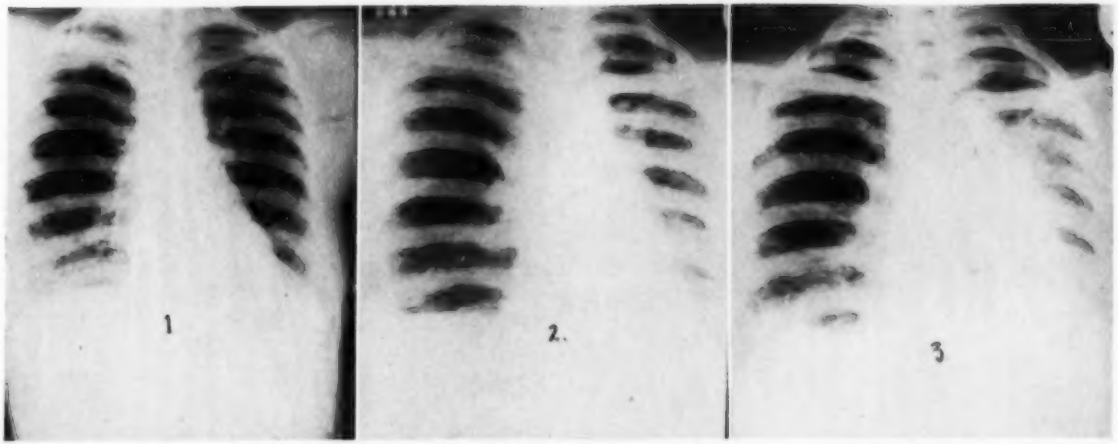

FIGURE 1 FIGURE 2 FIGURE 3

Figure 1: Familial Group I. Case 1. Film taken February 2, 1928.—*Figure 2:* Familial Group I Case 1. Film taken November 27, 1935.—*Figure 3:* Familial Group I. Case 1. Film taken June 16, 1937.

creased. She expired suddenly during the night of July 24, 1937, and the necropsy revealed the following:

Gross: Left: 370 gms. Right: 600 gms. The lungs appear quite small. The pleura of the left lung is smooth. Scattered all over the surface there are slightly raised, pale areas, which apparently are due to emphysematous changes. The lungs feel very firm and rather rubbery in consistency. The bronchi are injected and much tenacious exudate is found within them. The pulmonary arteries show slight thickening, and there are areas of fatty degeneration. On section, throughout both lobes there are many areas which are grayish due to fine scar tissue, apparently involving the alveolar wall. These are firm. The bronchioles contain thick yellowish exudate. The lung tissue is congested. No definite areas of pneumonia are found, and no tubercles seen. The right lung is similar in appearance. There is an apparently chronic pneumonitis with fibrosis.

Microscopic: Numerous sections show the same picture. Only occasionally small areas show normal appearing air sacs, and often these are full of fresh blood and the capillaries are congested. Alveolar walls elsewhere show fibrosis with loss of capillaries. There are scattered areas of well developed granulation tissue rich in vessels that are dilated and full of red cells. The pleura contains many dilated vessels also. There are mononuclear wandering cells and some alveoli contain polys. There are scattered collections of mononuclear and foreign body giant cells. There is nothing to indicate tuberculosis. Bronchi show some desquamated epithelium, some polys, and some are dilated. There are scattered areas where alveoli are dilated and the epithelium lining them looks like bronchial type. This could go on to malignancy, but as yet there is no indication of such degeneration. There is evidence of organization of exudate within alveoli. Arteries show some intimal thickening. Occasional thrombi are present in small vessels.

Heart: Weight, 320 gms. The epicardium is smooth, with moderate amount of fat. The right ventricular wall measures .7 cm. in thickness in some areas; the left 1.4 cms. There is very marked hypertrophy of the right ventricle and the chamber is dilated. The myocardium is firm in consistency, and free from scars. The coronary arteries are patent.

Microscopic: The right ventricle wall shows hypertrophy of muscle fibers, which are enlarged as compared with those of the left ventricle. There is some increase in interstitial tissue, particularly about large vessels.

Anatomical Diagnosis: Chronic pulmonary fibrosis. Purulent bronchitis. Slight bronchiectasis. Pulmonary arteriosclerosis. Right cardiac hypertrophy and dilatation. Slight hydrothorax and ascites. Chronic passive congestion of viscera.

Pathologist Note: Lung sections show fibrosis with more recent organization occurring, indicating that process is active and continuous. There is nothing specific about the reaction, so etiology cannot be stated. It would appear that there must be a low grade infection which from time to time has acute exacerbations.

Case II: Daughter of Case I (Figures 4 and 5).

Family History: At the time of its taking the story was unchanged. Mother died of pulmonary tuberculosis, as well as two aunts. Two sisters and one brother were alive and well.

Occupational and Allergic History: Negative.

Past History: A chest x-ray film taken in 1938 was negative. There was some indefinite history of sinus trouble.

Present Illness: This patient enjoyed good health until August 1945, when she developed a sore throat, followed by fatigue. November 1945 she developed pleurisy on the left side for several days. In the several months that followed she lost 20 pounds. A chest x-ray film at Iola Dispensary January 18, 1946, revealed pulmonary disease, which was felt to be of tuberculous etiology. She was on home treatment in the months that followed, with a resulting gain in weight and disappearance of pulmonary symptoms—notably cough. In January 1946 she resumed light household duties. December 1946 cough returned. January 1947 there developed increasing dyspnoea for which she was admitted to a general hospital June 14, 1947. There a diagnosis of pulmonary tuberculosis was again made, and she was subsequently transferred to Iola Sanatorium July 11, 1947.

As a result of our study following admission, the diagnosis of tuberculosis could not be substantiated, and we made a diagnosis of chronic interstitial fibrosis. It should be noted at this time that this diagnosis was made in view of negative findings for tuberculosis and a recollection of the findings in her mother's case. Physical examination of the chest was no different from the findings in the case of her mother. She reacted to tuberculin. Repeated sputa were negative for tuberculosis. White blood count was 9,600, with neutrophils 49 per cent, lymphocytes 39, and monocytes 11. Sedimentation rate was elevated. Histoplasmin skin test was 1 plus. Electrocardiogram was not unusual, other than a tendency to right axis deviation. One week before death axis deviation became marked. With increasing dyspnoea and no evidence of peripheral failure, she died September 3, 1947.

Following the autopsy of Case II, in which the pathological gross and microscopical findings were exactly the same as Case I (her

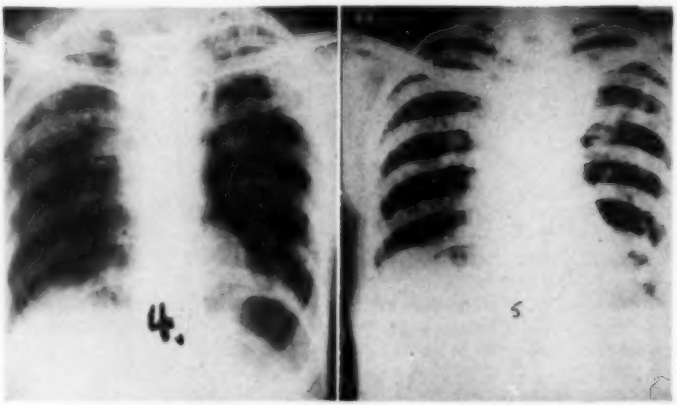

FIGURE 4 FIGURE 5

Figure 4: Familial Group I. Case 2. Film taken January 18, 1946.
Figure 5: Familial Group I. Case 2. Film taken July 11, 1947.

mother), further investigation brought out the following additional interesting familial details. The sisters of Case I died of pulmonary tuberculosis—one in 1918 and the other in 1919. A remaining sister had been killed accidentally.

Rechecking scanty hospital records of the sister who died in 1918, she was found to have died in our County Hospital. The only available data was that at the age of 36 she became acutely ill of a respiratory disease, and 24 days after admission died of, supposedly, pulmonary tuberculosis.

The second sister of Case I died in 1919, at the age of 30. She too became acutely ill of pulmonary disease and was admitted to the Rochester General Hospital. She died a respiratory death 15 days after admission. The only available data is nurses' notes and records of temperature, pulse, and respirations. On admission her temperature was 99.8 degrees F.; pulse 85; respiration 20. Gradually over the ensuing days her temperature rose to 104 degrees F.; pulse to 140; and respiration to 50. From the nurse's notes—at death— "There was cyanosis, rapid shallow breathing, cough, sputum—but no blood." Chest roentgenogram was reported as follows: "Consolidation, right apex, first and second interspaces; dense infiltration first, second, and third interspaces." Cause of death was given as pneumonia. Her admission diagnosis was influenza. No autopsy was performed on either case.

The possibility of a familial factor cannot be denied, but still in these last two cases that is as far as we can go. They were not typical of the diagnoses given, and they are not typical of pulmonary tuberculosis.

Familial Group II: Identical Twins.

This familial group has been admirably described in a recent paper by Drs. Peabody, Peabody, and Hayes.[3] To further strengthen their contentions and the author's conclusions, the surviving twin has since died and the pulmonary pathological findings were identical with her twin sister. It is the author's opinion that KI, used late in the course of the surviving twin's illness, may have been a factor in prolonging her life.

Familial Group III: Involving Non-identical Twins.

Case I (See Figure 6). Regarding white, married housewife, born April 3, 1908.

Family History: Father died of pneumonia. A brother died at the age of 36 of pneumonia. Three others are alive and well. One sister alive and well (non-identical twin). Regarding remaining sister, see Case II, which follows.

Past History: Negative. The patient was examined for the first time

at Iola Dispensary because of frequent colds and weight loss. A chest x-ray film of November 25, 1940, was negative.

Present Illness: On June 12, 1947, she was referred to Iola Dispensary because of dyspnoea. A more detailed history revealed that she had frequent chest colds for the past nine years. Orthopnea was now the major symptom. Vital capacity was 1100 cc. Sedimentation rate was normal. Red blood count 4,500,000. Hemoglobin 15 gms. Electrocardiogram showed tendency to right axis deviation, but no characteristic findings of chronic cor pulmonale. Her chest x-ray film (Figure 6) was interpreted as showing increased markings throughout both lungs. A diagnosis of pulmonary emphysema was made.

She was seen next by a physician in October 1948, at which time she demonstrated marked dyspnoea, orthopnea, cyanosis, and edema of both legs and sacrum. These symptoms had been gradually increasing in severity during the previous six months and had finally become so disabling that she sought medical aid. As a result, she was admitted to Strong Memorial Hospital on October 25, 1948.

Examination showed temperature 37.7 degrees C. Respiration 20. Pulse 120 and regular. Blood pressure 130/80. She was markedly dyspneic, orthopneic, and cyanotic. She had pitting edema of both legs and sacrum. On physical examination of the chest there was found increased resonance throughout; breath sounds were poorly heard. A chest x-ray film showed increased peribronchial markings throughout the entire lung parenchyma. The pulmonary conus was prominent and the right auricle enlarged. Electrocardiogram showed right axis deviation, sinus tachycardia, abnormal T waves. Red blood count was 5,000,000; hemoglobin 18 gms. per cent. CO_2 persistently 85 per cent volume. She gradually improved under medical care, but at the time of discharge still had tachycardia, high CO_2, high red blood count and hemoglobin. She was discharged on November 24, 1948, with a diagnosis of pulmonary emphysema, with fibrosis; cor pulmonale.

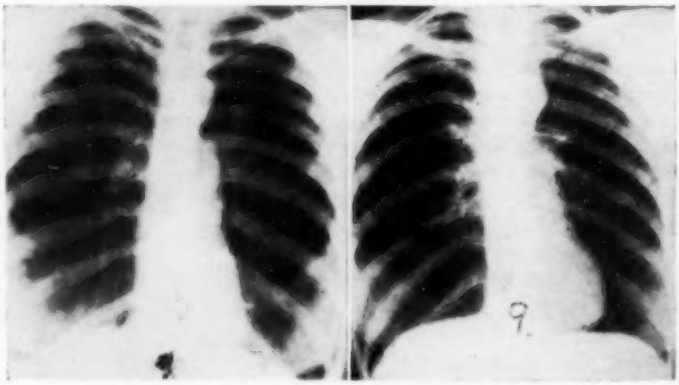

FIGURE 6 FIGURE 7

Figure 6: Familial Group III. Case 1. Film taken June 12, 1947.
Figure 7: Familial Group III. Case 3. Film taken January 28, 1947.

The patient got along fairly well at home for a period of about nine to 10 months. However, she gradually became so dyspneic, orthopneic, and cyanotic again that she was admitted of necessity for the second time to Strong Memorial Hospital, principally for oxygen treatment. She rallied from this state and became stabilized so that she could do fairly well without oxygen. She was discharged on August 28, 1949, only to return two months later. She was admitted to Strong Memorial Hospital for the third time on October 17, 1949. On October 21, 1949, she developed Cheyne-Stokes respiration and on October 22, 1949, she became comatose and expired.

Autopsy Findings: Lungs Gross: Left lung weighed 450 gms. and the right 550 gms. The left lung pleural surface is not remarkable with the exception of several adhesions. Dissection of pulmonary blood vessels reveals them to be widely patent throughout with thin walls and no thrombi. Bronchi contain a large quantity of thick blood-tinged mucoid material. Hilar nodes are not enlarged. The left lung is crepitant and air-containing throughout with bullous emphysematous blebs covering the entire surface. In some areas the blebs are seen to consist of numerous small areas of emphysematous tissue producing a coarsely honeycombed appearance. The basilar portion of the lower lobe is moderately wet and congested. The hilar portions of the lung show slight congestion but are air-containing throughout. The right lung is similar to the left in all respects.

Lungs Microscopic: All sections show marked enlargement of alveoli and atria, some symmetrically enlarged, others showing disappearance of interalveolar septa and irregular increase in alveolar diameter. In these areas the septa are very thin, consisting of only capillaries and a few fine fibrous strands. There is a patchy fibrosis, chiefly in perivascular and peribronchiolar areas, but fibrosis is interstitial in some places. Most sections show capillaries distended by blood. Many alveoli which are not emphysematous and which are in relation to vessels and bronchioles are lined by cuboidal epithelium. A few areas show pigmented macrophages within alveoli; other alveoli contain a small amount of granular acidophilic material in contact with alveolar walls. Bronchioles are lined by ciliated respiratory epithelium, which rests on congested connective tissue comprising the submucosa. Lumina are filled with macrophages, many filled by lipoid material. There is no inflammatory exudate or infiltration in any section. A few arterioles have organizing thrombi.

Heart: Weight 375 gms. The epicardium is smooth, contains a moderate amount of normal appearing fat, and epicardial vessels appear soft and pliable. The heart is considerably dilated in all diameters, but the size of the right heart is predominent. The right auricle is markedly dilated, measuring 6 x 6 x 5 cms. Dissection of the cardiac chambers reveals dilatation of the right ventricle with bulging of the interventricular septum towards the left. All cardiac chambers are filled by recently clotted blood. The foramen ovale is closed, and the ductus arteriosus is obliterated. The endocardium is smooth and thin throughout, and the papillary muscles, chordae tendinae, and trabeculae appear normal. Valves: Tricuspid 13 cms.; pulmonic 9; mitral 10; and aortic 8 cm. Valve leaflets appear anatomically normal and are thin and pliable. The root of the aorta shows normal caliber, a few scattered plaques of atheromatous material in the walls, and intact intima. Coronary vessel ostia are patent. The myocar-

dium of the left ventricular wall measures 1.3 cm. and the right 1 cm. It is dark red throughout, firm, and shows no local lesions. Coronary vessels are all widely patent with thin pliable walls and no occlusions.

Heart Microscopic: Myocardial fibers vary in size, tend to be large. Cross striations are well-preserved. Moderate perivascular fibrosis and edema.

Diagnosis: Pulmonary emphysema and fibrosis. Cardiac hypertrophy and dilatation, predominantly right side. Bilateral hydrothorax. Passive congestion of liver and spleen. Ascites. Dependent edema. Thrombophlebitis, left saphenous vein.

Case II: Housewife, born April 3, 1908. This is the non-identical twin of Case I, who is well, asymptomatic, and presents a normal chest x-ray film.

Case III (See Figure 7). Housewife, born August 7, 1902, sister of non-identical twins, Cases I and II.

Family history is same as Group III, Case I. Occupational and allergic history were negative. Past history showed bronchitis in March and April of 1943. On June 12, 1944, she was referred to Iola Dispensary because of cough. A chest x-ray film was interpreted as negative and she was discharged.

Present Illness: February 6, 1947, this patient was seen in consultation because of progressive cough, sputum, and increasing dyspnoea over the past eight years. At this time she was definitely a pulmonary invalid. Her chest x-ray film of January 28, 1947 (Figure 7), was interpreted as showing increased markings throughout both lungs with bilateral infiltration suggestive of fibrosis in both infraclavicular regions. Pulmonary emphysema was rather marked. Chronic interstitial fibrosis, pulmonary emphysema, and chronic bronchitis was felt to be the most likely diagnosis. Under a closely supervised rest regime the patient's clinical condition has remained unchanged to date.

Discussion

This so called "Pulmonary keloid response" to tissue damage and repair has already been mentioned. This response, which is relatively chronic in nature, carries with it numerous variables of reactions to disease and trauma. Pulmonary emphysema is a running mate to this entity. It too bares the variability of time and is also greatly influenced in its degree and extent by speed of reaction of the primary disease, as well as cough, age of patient, and familial predisposition. It is this reasoning which the author uses to explain the difference between the radiographic pictures of Groups I and II over Group III. Groups I and II were in build of a rather medium stocky type. Group III were slight and thin. Again where dyspnoea was the predominant symptom as compared to cough, it is felt that naturally the contracture of fibrosis will result in the predominate picture. Where cough is a predominate symptom, it naturally tends to produce a higher degree of emphysema, with resulting over-distention of the lungs.

This paper seems to present a disease involving the female side

of the family. This is not felt to be true. Similar disease has been seen in males, but at the present a familial group where males are the major factor has not been satisfactorily uncovered. The father of Group I, Case I, died supposedly of tuberculosis when she was a child. The parents' history of Group II is unknown. The father of Group III was supposed to have died many years ago of pneumonia. Because of time and the sparsity of details, one can only surmise. The fact that they further strengthen the "Achilles Heel" contention cannot be denied.

It is too early to make any positive statement regarding therapy and, of course, too late for those of this group who have died. Reviewing other suspicious cases of possible familial fibrosis, where potassium iodide has been used, it can be said that in every instance it has seemed to exert a beneficial effect. Three previously progressive cases are at present stationary or improved.

The question of cor pulmonale resulting from peripheral pulmonary vascular change is receiving further study. It is late in the course of these patients' illness that electrocardiographic evidence is present to substantiate pulmonary hypertension. At autopsy, however, rather marked right ventricular hypertrophy is very much in evidence. It is the author's impression that chronic cor pulmonale is a terminal change rather than a part of the disease entity.

Where this entity represents a true chronic process it is felt that some of the acute cases of chronic interstitial fibrosis reported in the past are undoubtedly of the same etiology. Cases described by Hamman and Rich[1] and also Eder and others[2] clinically and pathologically are identical with mine. It is interesting to note that of the four cases presented by Hamman and Rich three are females and one a male.

SUMMARY

1) The term Familial Pulmonary Fibrosis is felt to be a definite entity.

2) This disease is a familial response to chronic pulmonary insult in the nature of bilateral pulmonary fibrosis.

3) The disease, once it manifests itself clinically, is usually progressive to death.

4) The age incidence is from 30 to 55 years.

5) The possibility of potassium iodide being an inhibitor to increasing fibrosis warrants further investigation.

6) The importance of a detailed family history and an inquiry of the manner of death, rather than a diagnosis, is invaluable.

RESUMEN

1) Se considera que la designación Fibrosis Pulmonar Familiar corresponde a una entidad definida.

2) Esta enfermedad es una respuesta familiar a una afección crónica pulmonar, respuesta que es en forma de fibrosis pulmonar bilateral.

3) Una vez que la enfermedad se manifiesta clínicamente, generalmente es progresiva hasta la muerte.

4) La incidencia es en edades de 30 a 55 años.

RESUMEN

1) L'expression de tuberculose fibreuse familiale représente une entité définie.

2) Cette affection est la réaction que peuvent opposer certaines personnes de la même famille à la tuberculose pulmonaire chronique en constituant une forme fibreuse bilatérale.

3) Cette affection, quand elle se manifeste cliniquement, évolue en général progressivement jusqu'à la mort.

4) Elle survient de préférence entre 30 et 55 ans.

5) L'action possible de l'iodure de potassium, qui parait arrêter l'accroissement de la fibrose, demande des recherches ultérieures.

6) Les antécédents familiaux détaillés, et l'enquête sur les causes de la mortalité dans cette famille prennent une importance considérable. Ces éléments ont plus de valeur que les éléments donnés par l'examen du malade.

The author is grateful and indebted to Dr. Ezra R. Bridge, Veterans Hospital, Batavia, New York, and to Dr. Richard Snowman and the Pathology Department of Strong Memorial Hospital, Rochester, New York, for their kind assistance in making this paper possible.

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Medical Treatment of Abscess of the Lungs*

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About 40 years ago, in Turkey, as was the case in other countries, abscess of the lung was considered a rare disease. For instance, in the statistics of the internal clinic of the Gülhane Hospital in Istanbul, among the 6,900 patients who were treated during a 10 years' period (1899-1908) only two cases of gangrene were recorded and none of abscess of the lung. On the other hand in the four internal clinics, which I have had the honor of supervising during the years between 1924-1949, among the 18,935 patients, 259 cases of pulmonary abscess were observed. It is my opinion that this increase in pulmonary abscess is not only apparent but real.

When successive statistical data is reviewed, no decrease in the occurrence of abscess of the lung can be detected despite the application of sulfonamides in all kinds of infections and especially in the infections of the respiratory tract. Thus it appears that abscess of the lung, at least in Turkey, is for the most part a primary disease. In fact, of the 116 cases which form the subject of this review, 105 (90 per cent) were primary. The remainder were secondary as follows: two postpneumonic, two postgrippal, one due to the complication of an abscessed tooth, one to gastroenterostomy, one to appendicectomy, two to amoebiasis and one of bronchiectatic origin. We have not witnessed the occurrence of abscess of the lung after tonsillectomy. During the last 14 years among 3,613 cases of tonsillectomy recorded by the clinic of otorhino-laryngology of the University of Istanbul (Prof. Dr. Ekrem Behçet Tezel) no abscess of the lung occurred.

This communication deals with the 116 cases of pulmonary abscess observed in the Third Clinic of Internal Medicine of the University of Istanbul. Although I appreciate the statistics obtained through the methods of a modern clinic, in determining the efficacy of treatment I place more importance on the impression of a clinician attained by a close and careful analysis of the cases he has observed. This opinion is more correct in the case of abscess of the lung which is capricious in the clinical course it follows and in its reaction toward the different methods of treatment. If an exact opinion of the value of the treatment

*Presented at the First International Congress on Diseases of the Chest, Rome, Italy, September 20, 1950.

is desired, it is necessary to proceed in the analysis carefully and with a mind for full criticism.

Today abscess of the lung still remains a medico-chirurgical disease. Neither the brilliant results obtained in chest surgery nor the noteworthy success of the antibiotics has been able to alter the situation. That is why abscess of the lung belongs in that field of medicine where, for the success of the treatment, close cooperation between surgeon and physician is required.

In this communication I shall speak only of the medical treatment of pulmonary abscess. The drugs which we have employed are neo-salvarsan, emetine, alcohol (given intravenously), antigangrenous serum, sulfonamides and penicillin.

Neo-salvarsan was administered in 14 cases and the result was almost negative. However, in 1924, we obtained good results in three cases which we treated with neo-salvarsan only.

Emetine was administered to 25 patients. Complete recovery occurred in two cases of abscess due to amoebiasis, but the results were negative in the remaining 23 cases.

Alcohol was administered intravenously (30 per cent solution) in 16 cases. Marked results were obtained in only two cases. Remembering a case of my previous (1932) observation which had not reacted to any means of treatment then known and had been given up as hopeless, we administered alcohol intravenously. Recovery came about with astounding rapidity. This was really a resurrection.

Antigangrenous serum was administered in five cases of fetid abscess of the lung. Among these was one which showed a big cavity in the right middle lobe and expectorated daily 550 cc. of sputum. To this patient was first administered intramuscularly 4,000,000 U pf penicillin in 10 days. There was but little improvement. Then the antigangrenous serum was administered and the patient recovered very rapidly.

Sulfonamides were administered to 57 patients but in only four did we obtain remarkable results. In three, results were doubtful, and in the remaining 50 no improvement was observed.

Penicillin was administered by different routes. In 10 cases it was administered intramuscularly; four recovered completely, three showed great improvement and three were not benefitted.

In four cases penicillin was administered in the form of aerosol. In three improvement was apparent, but the fourth was unaffected. The combined use of aerosol with intravenous injections of penicillin gave good results in six of eight cases. In two it had no effect.

The endobronchial penicillin therapy method of Mattei and his collaborators has been used in our clinic by my assistant Nihad Zaloglu, M.D., since 1948. The amount of penicillin administered

each time varies between 1,000,000 and 400,000 units. While the total dose varies between 1, 2 and 2.5 million units. In 11 cases who had only endobronchial penicillin therapy, five recovered completely and excellent results were obtained in the others.

One patient was given penicillin both by the endobronchial route and in the form of aerosol. Great improvement was observed. In another combined endobronchial and intramuscular administration resulted in complete recovery. In three patients penicillin was administered intrabronchially, intramuscularly and in the form of aerosol. One recovered, one showed great improvement and one was a complete failure.

Thus, penicillin administered in 38 cases by different routes proved effective in 31.

SUMMARY

Medical treatment was administered to 116 cases of pulmonary abscess. The drugs employed consisted of neo-salvarsan, emetine, alcohol, sulfonamides and penicillin.

RESUMEN

Se usó tratamiento médico en 116 casos de absceso pulmonar. Las drogas consistieron en neo-salvarsan, emetina, alcohol, sulfonamidas y penicilina.

RESUME

116 cas d'abcès du poumon furent traités médicalement. Les thérapeutiques utilisées furent le novarsénobenzol, l'émétine, l'alcool, les sulfamides, et la pénicilline.

Discussion

LEE OGDEN, M.D., F.C.C.P.
New York, New York

It is a pleasure and privilege to discuss Prof. Tevfik Saglam's interesting paper.

Contrary to the experience of Dr. Saglam in Turkey, we in the U. S. A. had, 30 to 40 years ago, a tremendous mortality from lung abscess, ranging from 18 to 49.2 per cent. (The Charity Hospital in New Orleans reported 49.2 per cent mortality out of 417 cases of lung abscess). It is evident from this overwhelming mortality that we in the United States had to tackle this menace, and it seems to me that we met this challenge in a logical way.

The bacteriologists soon reported that the main etiological fac-

tor in a lung abscess is the invasion of pneumococci (27 per cent), streptococcus aureous (18 per cent), fusiform bacilli (17 per cent), streptococcus hemoliticus and viridans (14 per cent), micrococcus catarrhalis (12 per cent), and spirichetes (5 per cent). The foul odor is mostly due to the presence of fusiform bacilli, spirochetes and bacillus melaningenicus. So the causes of lung abscess are post-pneumonic complications, post-tonsillectomies, teeth-extractions, trauma, embolic phenomena, upper respiratory infections, post-operative procedures, local and general anesthesia and aspiration of foreign bodies. The occurrance is more common in the lower lobe, but I have seen it frequently in the upper and right middle lobe.

I exclude from my discussion abscess as a part of general pyemia, tuberculous abscess, and abscess secondary to bronchiectasis and tumors.

Let me repeat briefly that a lung abscess is a suppurative infection with cavitation, arising as a result of implantation of pyogenic organism in the periphery of a tracheobronchial tree which produces a pulmonary abscess, pulmonary gangrene, suppurative diseases of the lung, acute putrid abscess or aputrid abscess. The invaders are strictly anaerobic or mixed with aerobic. So, of paramount importance is the drainage of the abscessed cavity and oxygenation. When we drain such an abscessed cavity we find necrotic lung tissue and debris, which prevents healing. This mass of amorpheous debris interferes with oxygenation of the cavity and obstructs drainage of the communicating bronchus. If this mass can be eliminated through a bronchus spontaneously or through bronchoscopic aspiration, a complete recovery follows. But these recoveries are very rare and represent just a few isolated cases. We expected too much from bronchoscopic aspirations, postural drainage, pneumothorax and chemotherapy in treatment of closed abscessed cavities; that is why our results have been disastrous.

It was evident that an adequate oxygenation of closed abscessed cavities was only possible through drainage by means of surgery. Neuhoff and Touroff made the excellent observation that when an abscess is located peripherally, a pleural symphysis developes at an early stage, so external drainage is advisable in a single stage. They consequently operated on 122 cases with a mortality of 3.2 per cent; of course for putrid abscesses their one-stage transthoracic drainage was combined with chemotherapy. Then Shaw and Paulsen, Kent and Ashburn advocated pulmonary resections, with a tremendous drop in mortality. And finally Overholt and Rummel in 1941 in The New England Journal of Medicine came out with the idea to classify lung abscesses as "simple" and "com-

plicated," instead of acute and chronic, which always used to confuse the issue. A "simple" lung abscess has a simple cavity without extensive pneumonitis, fibrosis or bronchiectasis. A "complicated" lung abscess may have several daughter abscesses which cripples the patient. If we would take into consideration that the duration of abscessed cavities, according to literature, is known to exist between 7 weeks and 11 years, we can visualize how impractical it was to talk about acute and chronic abscess. So, in "complicated" abscess Overholt, with preliminary chemotherapy, resected the daughter cavities and, if improvement resulted, resected the main abscess. The mortality through this procedure dropped to 7.9 per cent, as reported at Fitzsimons General Hospital, but post-operative empyema occurred in 13.2 per cent. Even with the best technic, many other unpleasant complications occurred, such as sudden death due to air embolism or other embolism, intracranial suppuration, brain abscess or meningitis owing to the lodgement of septic emboli, intracranial involvement such as psychosis or hemiplegia and generalized pyemia. That is why Overholt emphasized the importance of what he calls "Surgical Danger Zone," which helps the surgeon to know where to incise, so as to avoid these very serious complications.

In upper lobe abscess, due to limitation of upper lobe bronchoscopy, a resection is advisable regardless of simple or complicated cavities.

A chest specialist in this country, as soon as he makes a diagnosis of a lung abscess, with the help of x-rays, bronchoscopy, bronchography (important in bronchopulmonary segments) calls in a thoracic surgeon immediately, in order to save precious time, and does not try chemotherapy for weeks. There is the same change in our approach to a lung abscess as in an acute appendicitis. We no longer wait as we did 25 or 30 years ago until an acute appendicitis should turn to a cold chronic appendicitis, and only in this stage consult a surgeon. We remember the catastrophic results of such an approach. A lung abscess calls for a thoracic surgeon immediately.

It is true, that, due to antibiotics and chemotherapy, the occurrance of lung abscess has diminished appreciably. In my hospital (Gouverneur Hospital in New York City) in the last year, I have seen one case of lung abscess out of 375 new patients including both adults and children.

College Interim Session

The Interim Session of the American College of Chest Physicians will be held at the Ambassador Hotel, Los Angeles, California, December 2 and 3, 1951. The American Medical Association Interim Session will be held in Los Angeles, December 4 through 7.

On Sunday, December 2, the California Chapter of the College will sponsor a scientific session consisting of morning and afternoon programs, round table luncheon discussions, and an x-ray conference in the evening. The evening session will be preceded by a cocktail party and dinner.

Morning Session:

H. Brodie Stephens, San Francisco, California, *Moderator.*

"The Mechanical Heart Apparatus,"
Sanford E. Leeds and Morris M. Culiner, San Francisco, California.

"Pre- and Post-Operative Cardiac Catheterization Findings in Mitral Stenosis,"
Richard S. Cosby, David C. Levinson, Willard J. Zinn, Sim P. Dimitroff, Robert W. Oblath, Varner J. Johns, Telfer B. Reynolds and George C. Griffith, Los Angeles, California.

"Selection of Patients for Mitral Commissurotomy,"
George C. Griffith, Pasadena, California.

"Surgical Treatment of Cardiac Valvular Stenosis,"
William H. Muller Jr., Los Angeles, California.

"The Etiology and Treatment of the Physiological Changes in Chronic Pulmonary Diseases,"
Burgess L. Gordon, Philadelphia, Pennsylvania.

"The Nature of Electrocardiographic Changes in Coronary Artery Thrombosis: An Experimental Study,"
Clinton M. Shaw, Alfred Goldman, Eliot Corday, S. Rexford Kennamer, Inga Lindgren, Allen D. Smith and Myron Prinzmetal, Los Angeles, California.

Luncheon Round Table Discussions:

1) "Chemotherapy in Diseases of the Chest,"
Emil Bogen, Olive View, California and Edward Dunner, St. Louis, Missouri.
Moderator: J. J. Singer, Beverly Hills, California.

2) "Cancer of the Lung,"
Lyman A. Brewer III and Lewis W. Guiss, Los Angeles, California.
Moderator: Seymour M. Farber, San Francisco, California.

3) "Modern Management of Pulmonary Tuberculosis,"
Reginald H. Smart, Los Angeles, W. L. Rogers, San Francisco, California and James S. Edlin, New York, New York.
Moderator: Chesley Bush, Berkeley, California.

Afternoon Session:

J. Winthrop Peabody, Washington, D. C., *Moderator.*

"100 Cases of Spontaneous Pneumothorax,"
Robert L. Walters, John N. Briggs and Francis X. Byron, Los Angeles, California.

"Primary Tuberculosis in Adults,"
Jay Arthur Myers, Minneapolis, Minnesota.

"The Significance of the Bronchopulmonary Segment,"
Chevalier L. Jackson, Philadelphia, Pennsylvania.

"Pulmonary Histoplasmosis,"
Alfred Goldman, St. Louis, Missouri.

"Chemotherapy for Tuberculosis Using Minimal Dosage Schedules,"
J. P. M. Black, San Fernando and
Emil Bogen, Olive View, California.

"Pre- and Post-Operative Pulmonary Function Studies in the Tuberculous Patient,"
Frank Cline Jr., Seattle, Washington.

Dinner:

Jane Skillen, Olive View, California, President, California Chapter, American College of Chest Physicians, presiding.

Guest Speaker: Leo Eloesser, United Nations, New York City, "Activities of the United Nations International Children's Emergency Fund."

X-Ray Conference:

Burgess L. Gordon, Philadelphia, Pennsylvania and
Marcy L. Sussman, Phoenix, Arizona.

Moderator: David Salkin, San Fernando, California.

The Board of Regents of the College will hold its semi-annual meeting at the Ambassador Hotel, Los Angeles, on Monday, December 3.

Physicians planning to attend the Interim Session are urged to write at once for hotel rooms. Please address requests for accommodations to Dr. Joseph L. Robinson, 1136 West Sixth Street, Los Angeles 14, California, Chairman of the Committee on Housing for the College Interim Session. It is important that arrival and departure dates be given, as well as the type of accommodations required. Physicians who desire to remain for the Interim Session of the American Medical Association, December 4-7, should indicate this in their request for hotel accommodations.

1952 Annual Program

The Eighteenth Annual Meeting of the American College of Chest Physicians will be held at the Congress Hotel, Chicago, Illinois, June 5 through 8, 1952. Physicians interested in presenting their work are invited to submit titles and abstracts of their material to Dr. Harold G. Trimble, 2930 Summit Street, Oakland, California, Chairman of the Committee on Scientific Program of the College.

Report of the Committee on Membership

As of June 1, 1951, there were 3,495 members in the College, and 112 applications for membership were pending investigation. This is an increase of 366 new members admitted into the College during the past year. Of the 3,495 members, 2,366 are Fellows of the College, 248 are Associate Fellows and 881 are Associate Members. Our increase represents 181 Fellows, 45 Associate Fellows and 140 Associate Members.

In the United States of America and its possessions, there are 2,246 members, while in countries outside of the United States, there are 1,249 members. Our membership in other countries is distributed in 66 countries. Since the report of the Membership Committee in 1950, new members have been admitted from six additional countries.

Chevalier L. Jackson, *Chairman.*

Report of the Committee on Chest Diseases in Institutions

Our Committee, through the interchange of ideas during the past year, has formulated a five-page questionnaire regarding a national survey of tuberculosis control programs in mental and penal institutions. This questionnaire was sent to each state and to the District of Columbia, Alaska, Guam, Hawaii and Puerto Rico.

This research is intended to be of historical as well as of scientific value. It includes such features as case-finding programs; morbidity and mortality from tuberculosis for the past twelve years; evaluation of facilities for diagnostic problems as well as diagnosed cases; analysis of the type of sputum report which is acceptable; type of care administered, including collapse therapy, chemotherapy; ratio of nurses to patients and physicians to patients; evaluation of the type of physicians and whether medical care is administered by a chest specialist, general practitioner or psychiatrist; use of B.C.G.; and rehabilitation as well as a brief description of the tuberculosis control program of each state institution.

The response from the 48 states as well as the other areas has been encouraging. To date, only six states have not responded. The reports thus far can only be regarded as preliminary, since there will of necessity be a considerable amount of exchange of correspondence before conclusive evidence can be presented. From the information available at the present time, it appears that there is a continuation of considerable lethargy throughout the nation in adequate and progressive tuberculosis control programs.

An exhibit and a short outline of the Tuberculosis Control Program in the Illinois Welfare Institutions were presented by one of our members (E. T.) in October, 1950, at the Second Mental Hospital Institute held under the auspices of the American Psychiatric Association in St. Louis, Missouri. At this meeting, a special program was devoted to tuberculosis control in mental hospitals, and a paper was presented by Ernest A. Clark, M. D., Superintendent of the Woodstock State Hospital, Ontario, Canada. The very stimulating discussion showed the increasing interest among state hospital superintendents in this subject as well as the need for a well organized plan. Another Committee member (O. L. B.) presented a paper "Trends in Tuberculosis Work" before the Annual Meeting of the Medical Correctional Association held in conjunction with the American Correctional Congress, October 9, 1950, in St. Louis, Missouri.

In the past year, the states of Indiana and New Jersey have made inquiry, seeking assistance in setting up acceptable tuberculosis control programs for their respective institutions. In the state of Wisconsin, Dr. Laurie Lee Allen made a survey of the Wisconsin facility, and he has been encouraged to report it in the state medical journal. In Illinois State Mental Institutions where all are examined by semi-annual chest x-rays, the incidence of reinfection tuberculosis as well as the number of far advanced cases of tuberculosis have decreased approximately 75 per cent in the past five years (1945-1950, inclusive).

From the knowledge we have been able to gather from those working in the field, there seems to be unanimity of thought in at least the states having heavy loads of tuberculous mental patients as well as tuberculous

inmates in prisons that there should be encouragement in the establishment of centers for isolation and treatment and that these centers should be as near the metropolitan areas as possible in order to assure continuity of excellent medical treatment.

From the interest displayed by well meaning physicians and groups, there appears to be need for the establishment of basic standards which should be broad enough to provide for the responsibility for the health of patients and inmates within institutions. When presented in printed form, the pamphlet should include hospital construction, geographic locations, case finding, organization of diagnostic and therapeutic facilities, professional and non-professional staff, rehabilitation, follow-up and cooperation with outside agencies. Such a report should be worked out in cooperation with the American Psychiatric Association, the Medical Correctional Association, the American College of Surgeons, the American Trudeau Society and other interested organizations, as well as our own.

The Committee would appreciate the receipt of any suggestions regarding the subject matter.

Otto L. Bettag, *Chairman*
Ernest Teller, *Vice-Chairman*
P. J. Sparer, *Secretary*
Byron Francis
Leon H. Hirsh
A. A. Leonidoff
Moses J. Stone.

POSTGRADUATE COURSE IN DISEASES OF THE CHEST TO BE HELD AT THE UNIVERSITY OF COLORADO

A postgraduate course in diseases of the chest will be given at the University of Colorado College of Medicine on October 18, 19 and 20, to be sponsored jointly by the University, the Colorado Trudeau Society and the Rocky Mountain Chapter of the American College of Chest Physicians. Tuition fee is $25.00 and applications may be obtained by writing to Dr. Charley J. Smyth, Postgraduate Extension, University of Colorado School of Medicine, Denver, Colorado.

POSTGRADUATE COURSE IN DISEASES OF THE CHEST TO BE PRESENTED AT THE UNIVERSITY OF OREGON

A postgraduate course in diseases of the chest will be presented at the University of Oregon, October 29-31, sponsored jointly by the University and the Pacific Northwest Chapter of the College. The lectures will be given by the University of Oregon Medical School Staff and guest lecturers are Dr. Thomas H. Holmes, Assistant Professor of Psychiatry, University of Washington School of Medicine, Seattle, and Dr. Ross Robertson, Professor of Surgery, University of British Columbia Medical School and Thoracic Surgeon to Shaughnessy Veterans Hospital and Vancouver General Hospital. The committee for the postgraduate course include Dr. Howard P. Lewis, Professor of Medicine; Dr. Charles N. Holman, Administrator and Medical Director; and Dr. William S. Conklin,

Assistant Clinical Professor and Head of Division of Diseases of the Chest, University of Oregon Medical School.

A joint meeting of the Pacific Northwest Chapters of the College and the American Trudean Society will follow the postgraduate course, November 1 and 2, and physicians in attendance are invited to participate. Papers will be presented by physicians from Washington, Oregon, British Columbia and Alaska on subjects of interest to both specialists and general practitioners. A clinical pathological conference is scheduled for Friday morning, November 2.

College Chapter News

KENTUCKY CHAPTER

The Kentucky Chapter of the College will hold its annual meeting at the Brown Hotel, Louisville, on October 4. The State Medical Society of Kentucky is also meeting in Louisville during October 2, 3 and 4. Dr. Julian Johnson, Philadelphia, Professor of Surgery, University of Pennsylvania, will be guest speaker at the chapter luncheon meeting. Dr. R. O. Joplin, Louisville, President of the chapter will preside.

Lawrence O. Toomey, Secretary.

MISSOURI CHAPTER

The annual meeting of the Missouri Chapter was held at the President Hotel, Kansas City, on April 22, 1951. Dr. Charles A. Brasher, President of the Chapter, presided at the business meeting held during luncheon. Officers elected for the fiscal year, 1951-1952 were:

Elmer E. Glenn, Springfield, President.
Lawrence E. Wood, Kansas City, Vice-President.
Alexander J. Steiner, St. Louis, Secretary-Treasurer.

Dr. Jacob S. Hoffman, Kansas City, was appointed chairman of the program committee for the chapter.

The outgoing president, Dr. Brasher, expressed his appreciation for the splendid cooperation of the officers and the program committee. The program committee was composed of Dr. Hoffman, Dr. Wood, and Dr. W. W. Buckingham of Kansas City. Their excellent program was attended by more than fifty physicians. Dr. Andrew L. Banyai, Milwaukee, Wisconsin, was guest speaker. The committee on special arrangements handled its assignment splendidly; the committee was composed of Dr. Glenn, Dr. Alfred Goldman, St. Louis, and Dr. Buckingham.

Alexander J. Steiner, Secretary.

NEW ENGLAND STATES CHAPTER

At a recent meeting of the officers of the New England States Chapter of the College it was decided to have a combined meeting of the Chapter and the Overholt Clinic on the first Wednesday of every month, to be held at the Deaconess Hospital, Boston, Massachusetts. Members may communicate with the Secretary of the Chapter for further information concerning the planned meetings.

John B. Andosca, Secretary.

PACIFIC NORTHWEST CHAPTER

The Pacific Northwest Chapter of the College will meet jointly with the Pacific Northwest Chapter of the American Trudeau Society on November 1 and 2, immediately following a postgraduate course in diseases of the chest to be presented at the University of Oregon Medical School, October 29-31, under the sponsorship of the University and the College Chapter. The chapter meeting will be held at the University of Oregon Medical School Auditorium.

Thursday, November 1 — Morning Session:

Registration.
"Circumscribed Pulmonary Lesion,"
Albert R. Allen, Yakima, Washington.
"Peripheral Pulmonary Masses,"
Waldo O. Mills, Seattle, Washington.
"Significance of Clubbed Fingers,"
J. Karl Poppe, Portland, Oregon.
"One-Stage Thoracoplasty Using an Adhesive Hemicast,"
W. D. Trapp, Vancouver, B. C.

Afternoon Session: .

Business Meeting,
Pacific Northwest Chapter, American College of Chest Physicians.
Luncheon, University State Tuberculosis Hospital.
Business Meeting,
Pacific Northwest Trudeau Society.
"Indications for Cardiovascular Surgery,"
Herbert Griswold, Portland, Oregon.
Clinical X-Ray Conference,
Selma Hyman, Portland, Oregon.

Friday, November 2 — Morning Session:

Clinicopathological Conference,
Warren C. Hunter, Howard P. Lewis,
and Staff, University of Oregon Medical School.
Clinical Discussion: Roberts Davies, Seattle, Washington.
"Why do Tuberculosis Patients Die? A Study of 60 Consecutive Sanatorium Deaths,"
Eugene H. Wyborney, Seattle, Washington.
"The Practical Significance of Tuberculous Infection with Streptomycin-Resistant Organisms,"
L. S. Arany, Walla, Walla, Washington.
"The Effect of PAS on Carbohydrate Metabolism,"
Daniel W. Zahn, Seattle, Washington.
"Cardiac Arrhythmias Occurring During Thoracic Surgery—Report of One Case of Ventricular Fibrillation with Survival,"
Frederick L. Coddington, Mt. Edgecumbe, Alaska.
"Pre- and Post-Operative Pulmonary Function Studies in Tuberculosis Patients,"
Frank Cline Jr., Seattle, Washington.

Afternoon Session:

Movie Program,
Subjects relating to the Medical and Surgical Care of the Thoracic Patient.
John E. Tuhy, Portland, Oregon.

ROCKY MOUNTAIN CHAPTER

A joint meeting of the Rocky Mountain Chapter of the College and the Colorado Trudeau Society was held at the Shirley Savoy Hotel, Denver, Colorado, on Saturday, September 22. The following program was presented:

"Review of Chest Lesions from the Salt Lake City Mass Chest X-Ray Survey,"
Theodore Noehren, Salt Lake City, Utah.

"An Evaluation of Treatment Methods in Tuberculosis,"
Charles K. Petter, Waukegan, Illinois.

"Chemotherapy in Treatment of Pulmonary Tuberculosis,"
Frederick Hughes, Denver, Colorado.

"Chronic Suppurative Lung Disease,"
Round Table Discussion.
Panel: James J. Waring, Moderator,
Charles F. Ingersoll
Robert K. Brown
Richard Mulligan
Leighton Anderson
Dumont Clark.

X-Ray Conference — Presentation of Unknown Chest Lesions,
Panel: John S. Bouslog
Robert Liggett
Sien Holley
William Stone
John R. Durrance.

W. Bernard Yegge, Secretary.

SOUTHERN CHAPTER

The Eighth Annual Meeting of the Southern Chapter of the College will be held on November 4 and 5, 1951, in Dallas, Texas, in conjunction with the annual meeting of the Southern Medical Association, November 3 through 8. The Adolphus Hotel, Dallas, will be headquarters for the Southern Chapter. The complete program appeared in the September issue of "Diseases of the Chest." Physicians desiring accommodations during the meeting are urged to write at once to the Adolphus Hotel.

College News Notes

Dr. Frank R. Ferlaino, New York City, has recently been appointed Associate Editor of the Journal of Industrial Medicine and Surgery. Dr. Ferlaino serves as secretary of the Council on Postgraduate Medical Education of the College.

Dr. Chevalier L. Jackson, President of the College, recently moved his offices from Temple University Hospital to 1901 Walnut Street, Philadelphia, Pennsylvania.

Dr. Archibald J. Collins, Sydney, Australia, has been made president of the Federal Council of the British Medical Association in Australia.

Dr. Walter E. Vest, Huntington, West Virginia, has been re-elected chairman of the West Virginia Medical Licensing Board.

Dr. Eugene J. Des Autels was recently appointed Chief of Tuberculosis Service at the Veterans Administration Hospital, Hines, Illinois.

Obituaries

PEDRO L. FARIÑAS

1892 - 1951

With the recent death of Dr. Pedro L. Fariñas, Fellow of the American College of Chest Physicians for more than ten years and President of the Cuban Chapter, the medical profession has lost a member of unusual ability and character whose achievements in his chosen field of radiology attained international recognition.

Pedro L. Fariñas was born in the city of Santa Clara in central Cuba on October 19, 1892. Despite adverse circumstances he completed preliminary studies and entered the Medical School of the University of Havana graduating *Cum Laude* in 1917. As an undergraduate he became interested in the then incipient science of radiology and one year before graduation was appointed chief radiologist in a large semiprivate hospital in Havana. This institution sent him to Chicago upon graduation for a course in radiological technic and interpretation.

In the years that followed Dr. Fariñas did much pioneer work in radiology and through unremitting scientific endeavors and numerous publications, his name became justly identified with radiological progress both in his country and abroad. Proof of this is the number of medical and other scientific societies that counted him their honorary member, among others the Radiological Societies of Mexico, Argentine, Colombia, Ecuador, Peru, Venezuela, The American Roentgen Ray Society, American College of Radiology, Interamerican College of Radiology, etc.

Despite the exacting requirements of an ever-increasing practice, Dr. Fariñas found time for constant research, the result of which he expounded in more than a hundred scientific papers and at the many medical congresses and meetings that he attended. All the important radiological journals published or quoted Dr. Fariña's work. His original technics for serial bronchography, bronchography by atomization, tomography, aortography, and venography aroused much interest.

In the field of diseases of the chest he made important contributions to the diagnosis and treatment of tuberculosis, bronchial carcinoma, suppurative diseases of the lungs and bronchi, mediastinal and cardiovascular diseases.

A born teacher, Dr. Fariñas unselfishly devoted much time to instructing and training his colleagues in radiological technic and interpretation. Besides acting as consultant for many hospitals and similar institutions he took part in graduate teaching in the Universities of Havana and Mexico and in courses of instruction in bronchography and clinical radiology in Boston and Havana.

He was one of the founders of the Cuban Chapter of the American College of Chest Physicians and late in 1949 was elected President of the Chapter. In this capacity he organized and directed a Postgraduate Course in Diseases of the Chest under the auspices of the College. This course marked a turning point in postgraduate medical education in Cuba and received much favorable comment in this and neighboring countries.

Dr. Fariñas distinguished himself also as a champion of the rights and interests of the medical profession. Organized medicine in Cuba is much indepted to him.

During his busy professional life Dr. Fariñas received honors and distinctions from his and many other countries. He also held important posts in every international radiological congress held in recent years, among others that of Chairman of the Section of Radiodiagnosis, V International Congress of Radiology, Chicago 1937; President, II Interamerican Congress of Radiology, Havana 1946; Vice-President Emeritus, VI International Congress of Radiology, London 1950, etc. He was appointed Professor Extraordinary of Radiology of the Universidad Nacional de Mexico in 1933.

Dr. Fariñas passed away in Havana, April 26, 1951, after a brief illness resulting from coronary thrombosis. He is deeply mourned by his many friends and admirers in all walks of life who regarded him as an eminent man of science and exemplary citizen.

Antonio Navarette, Regent for Cuba.

JOHN MAXWELL MacDOUGALL

1910 - 1950

Dr. John M. MacDougall, Superintendent, Brant Sanatorium, Brantford, Ontario, died after an illness of several days in the Brantford General Hospital, October 26, 1950. His death brings to a close a brief but brilliant career in the tuberculous field. He was only forty years of age.

Born in Acton, Ontario, Dr. MacDougall received his medical training at the University of Toronto and graduated in 1939. He joined the staff of the Mountain Sanatorium, Hamilton, Ontario, where he was particularly interested in the radiological and clinical aspects of tuberculous enteritis and tuberculous empyema.

In 1946, Dr. MacDougall went to Brantford Sanatorium, as medical superintendent and about the same time became a Fellow of the College. His was a warm and friendly personality and he was most popular with patients and staff. He was keenly interested in civic affairs and served on the Crippled Children's Committee of the Brantford Rotary Club. Surviving are his widow, two sons and one daughter.

H. I. Kinsey, Governor for Ontario, Canada.

PHILIP WELD HARDIE

1906 - 1951

Doctor Philip Weld Hardie, died suddenly of cardiac infarction, on March 18, 1951, in Hamilton, Ontario. He was forty-five.

Born in Victoria, B. C., he was a graduate of the University of Toronto.

He interned at the Toronto General Hospital and the Banting Institute.

He joined the staff of the Mountain Sanatorium in Hamilton in 1932 and remained until 1941, when he enlisted in the R.C.A.M.C., serving as assistant director at Canadian Military headquarters in London, England. He was discharged as lieutenant-colonel.

Taking up civilian life again, he joined the McGregor Clinic, Hamilton, Ontario, as an Internist. Besides being a Fellow of the College, he was a member of the Royal College of Physicians, London, England; a Fellow of the Royal College of Physicians, Canada; and the American College of Physicians. Phil Hardie was a conscientious physician, beloved by his patients.

He is survived by his wife, two daughters and a son. Dr. George Hardie of Jackson, Michigan, is a brother.

H. I. Kinsey, Governor for Ontario, Canada.

GEORGE BURTON GILBERT

1881 - 1951

Dr. George Burton Gilbert died suddenly on April 6, 1951, of coronary occlusion, at his home in Colorado Springs, Colorado. He was born on September 28, 1881, in Thomaston, Connecticut. Dr. Gilbert received his Bachelor of Arts degree from Yale University in 1903 and his degree of Doctor of Medicine from the John Hopkins Medical School in 1908. After an interneship in the Hartford Hospital in Hartford, Connecticut, he came West and was resident physician at Cragmor Sanatorium. Having been a victim of tuberculosis, he naturally turned to the research and study of this disease, and became associated with the late Dr. Gerald B. Webb in his laboratory. The problem was to find an avirulent type of tubercle bacilli which could be used to vaccinate persons against tuberculosis. As many persons were coming West to seek recovery at the higher altitude, Dr. Gilbert left the full-time laboratory work and entered private practice in 1911, becoming one of the outstanding tuberculosis specialists of the region. He was one of the first to use pneumothorax in treatment and was a very skillful artist at this operation.

Dr. Gilbert was attending physician at the Glockner-Penrose Hospital, at St. Francis Hospital and Sanatorium, at Sunnyrest Sanatorium and at the National Methodist Sanatorium. He was consulting physician at Bethel Hospital, now Memorial Hospital, and was consulting internist at the Union Printers Home. He was a member of the American Medical Association, the American Clinical and Climatological Society, he was a member of and had served as Regent for the American College of Chest Physicians. He was a member of the National Tuberculosis Association and of the Trudeau Society. When the Colorado Foundation for Research in Tuberculosis was organized, he served as one of the research directors. Dr. Gilbert contributed to the various medical journals over the years on his research findings and observations. For a number of years he was an instructor in the school conducted locally for doctors who wished to learn about the treatment and diagnosis of tuberculosis.

Because of the untiring efforts of men like Dr. Gilbert in the fight against tuberculosis, the death rate from this disease has been greatly reduced during the last decade.

Arnold Minnig, Governor for Colorado.

Book Review

"L'avviamento al lavoro del tubercoloso. Indirizzi di carattere medico-sociale. Controllo biologico e funzionale del soggetto." (Work training of the tuberculous. Medical social aspects. Biological and functional testing of the patient). ANTONLUIGI MACCAGNO, Medico primario, Instituto Forlanini, Clinica delle malattie dell'apparato respiratorio dell'Universita di Roma. Pp. 199, 37 figures, tables, graphs. Price Lire 1600. Soc. Editrice Universo, Roma 1950.

Omodei-Zorini, while acting as director of the sanatorium Principe di Piemonte in Naples, encouraged studies of respiratory physiology and many articles were published by his assistants De Michele and Filia, and mainly by Giuseppe Scoz, whose ingenuity and knowledge were well above average. Scoz, most of the time a patient in the hospitals in which he worked, became later associated with Maccagno, during the time in which the latter directed the sanatorium Cuasso al Monte. Early in 1949, Scoz died. His name has been mentioned at this place because a great part of the material on respiratory functional tests published in the reviewed book is based on his own work.

In 1945, Omodei-Zorini took over the direction of the Forlanini Institute in Rome. His interest in rehabilitation was the same, thus he improved the existing facilities by adding a laboratory for applied psychology (conducted by Talarico) with the purpose of establishing the patient's potential abilities for a given profession. He also expanded the existing section on respiratory physiology (conducted by Canova) and appointed on its staff Maccagno, after latter had moved to Rome in 1948.

The Italian federation for the control of tuberculosis, through the efforts of its secretary general, Giovanni L'Eltore, organized a clinic for the rehabilitation of out-patients and Maccagno was assigned to take care of it. He was also sent by an official Italian health agency to make a survey of rehabilitation work in various foreign countries.

After 30 pages of introduction, with the customary dogmatic statements, the report on the above survey is included in the book and these 40 pages contain many valuable facts and figures on what is going on in rehabilitation of the tuberculous throughout the world. The following 30 pages are devoted to an expose of the situation and needs in Italy. Fifteen more pages bring 500 word statements on the subject by 20 authoritative sources from all over the world. The American on the list is Holland Hudson (New York).

The second part of the publication (45 pages) deals with the biological and functional tests used for the evaluation of the patient's condition. In the biological group quite an emphasis is laid upon the (somewhat antiquated in our opinion) sedimentation rate and plasma lipase. As to the functional group, there is a very clear, almost didactic, description of the various tests which have been successively developed, leading through the improvement of the Knipping and Scoz method, apparatus and technic to the Maccagno and Canova method, apparatus and technic.

Maccagno's publication does not present clinical histories, nor is it intended to be a complete study of the subject, nor is it exhaustive to either methods, technics or bibliography. Though no attempt of completeness has been made or claimed, it is felt that some authors, especially Italian, should not have been omitted. Yet for the mentioned international survey and for the apparatus and technic described together with the quoted classification, the perusal of this book is recommended to all those interested in the subject.

COLLEGE EVENTS

Interim Session, American College of Chest Physicians, Ambassador Hotel, Los Angeles, California, December 2-3, 1951.

Denver Postgraduate Course, Denver, Colorado, October 18-20, 1951.
Minneapolis Postgraduate Course, October 18-20, 1951.
Portland Postgraduate Course (Oregon), October 29-31, 1951.
North Carolina Chapter Meeting, Asheville, October 31, 1951.
Southern Chapter Meeting, Dallas, Texas, November 4-5, 1951.
New York City Postgraduate Course, November 12-17, 1951.

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Applications are invited for positions of Resident and Assistant Resident at Grace Dart Home Hospital, 6085 Sherbrooke Street, East, Montreal. This is a 145 bed tuberculosis hospital, approved by the American College of Surgeons, and covers all aspects of medical and surgical treatment. Duties to commence July 1, 1952. Apply to Medical Director.

Staff physicians. Modern 380 - bed tuberculosis hospital. Metropolitan area. Man or woman acceptable, must be U. S. citizen, graduate of approved school. eligible for Ohio license. Salary depends on training—up to $6,000 plus maintenance. Address Box 236A, American College of Chest Physicians, 112 East Chestnut St., Chicago 11, Ill.

The Veterans Administration Hospital, Downey, Illinois, has vacancies for several physicians in the 217 bed Tuberculosis Unit of the hospital, as well as for an internist in the General Medical Unit. Applicants should write to Personnel Officer, Veterans Administration Hospital, Downey, Ill.

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More than 75 physicians and clinics throughout the country are carrying out research programs sponsored by The Armour Laboratories to determine the medical and surgical values of crystalline trypsin, an enzyme from the pancreas.

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The department of experimental surgery at Ohio State University, Columbus, Ohio, last October first reported success in using Tryptar as a drug to destroy necrotic or dead tissue in the body. It was employed in tuberculous empyema, a complication of tuberculosis. Previous efforts to use the proteolytic property of trypsin in this and other diseases and failed because of toxic reactions. Recrystallized trypsin from Armour succeeded, since its high purity and potency and freedom from foreign protein, eliminated the reactions.

That report opened up the possibility of using it in other disease states involving dead tissue and The Armour Laboratories immediately established the program for testing it in many applications.

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Thus, while the surgeon often properly removes some sound tissue to make certain of preventing infection or gangrene, Tryptar stops when the dead material is digested. That is important in such cases as a leg amputation following frostbite or serious injury, when Trfptar sometimes makes is possible to save enough of the leg to permit wearing a prosthesis instead of crutches for life.

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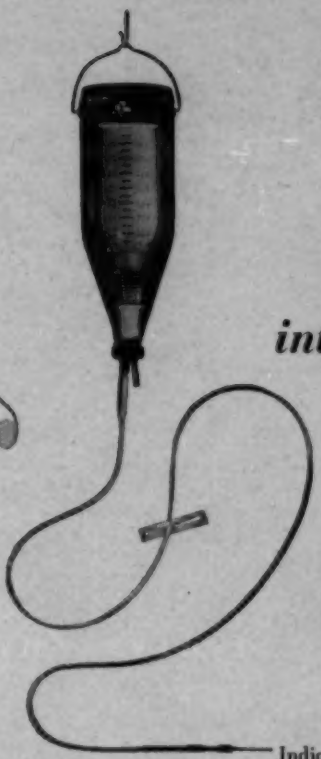

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*TEMPEL, C. W., FREDERIC, J. H. Jr., MARDIS, R. C., TOWBIN, M. N., and DYE, W. E. Combined intermittent regimens employing streptomycin and PAS, Am. Rev. Tuberc., 1951, 63, 295

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